46

PHYSICS ABSTRACTS

BEING

SCIENCE ABSTRACTS—SECTION A

EDITED AND ISSUED MONTHLY BY
THE INSTITUTION OF ELECTRICAL ENGINEERS
IN ASSOCIATION WITH
THE PHYSICAL SOCIETY
THE AMERICAN PHYSICAL SOCIETY
THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

UNIVERSITY LIBRARY

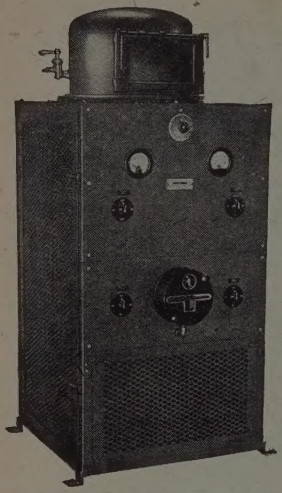
Price, Single Numbers, 3s. 6d.
Annual Subscription, 35s., including the Yearly Index.
Annual Subscription, for both Sections, 60s.

Copyright.

ABSTRACTS 1284–1554

Vol. 46 JUNE, 1943 No. 546

THE DEPOSITION OF METALLIC FILMS by the SPUTTERING PROCESS



Sputtering outfit consisting of chamber mounted on framework enclosing pumping and high tension equipment, with indicating and control instruments on front panel.

We supply complete plants, self-contained and ready for use, which can be operated by unskilled workers. Our standard units are already extensively employed for normal industrial processes, but we are always prepared to discuss special plant and specific problems with industrial or research workers actively interested.

- QUARTZ OSCILLATOR CRYSTALS
- OPTICAL PARTS OF ALL KINDS
- PHOTO CELLS
- MICROPHONE ELECTRODES

Etc., etc.

W. EDWARDS & Co. (London) Ltd.

Makers of Apparatus for the Production, Utilisation and Measurement of High Vacuum

KANGLEY BRIDGE ROAD, LOWER SYDENHAM, LONDON, S.E.26

Telegrams: EDCOHIVAC, PHONE LONDON *Telephone: SYD. 7026-7-8*

CONTENTS—ABSTRACTS 1284–1554

For details of the Universal Decimal Classification see British Standard 1000.

		Page
31	Statistics	105
51	Mathematics	105
52	Astronomy	106
53	Physics: General	108
531	Mechanics	108
532	Liquids. Hydrodynamics	109
532.6	Surface tension	110
532.7	Solutions	111
533	Gases. Aerodynamics	112
534	Sound. Vibrations	112
535	Optics	113
535.24	Photometry	113
535.3	Reflection. Refraction	113
535.33	Spectra	114
535.34	Absorption	114
535.37	Luminescence	115
535.4	Interference. Diffraction	116
535.5	Polarization	116
535.6	Colour	117
535.7	Vision	117
535.8	Instruments	118
536	Heat	118
536.7	Thermodynamics	119
537	Electricity	11
537.531	X-rays	12
537.533	Electron rays	12
537.7	Electrical measurements	12
538	Magnetism. Electromagnetism	12
539	Molecular and atomic physics	12
539.16	Radioactivity	12
539.185	Neutrons	12
539.2	Microstructure	12
539.3	Elasticity. Strength	12
541	Physical chemistry	12
548	Crystallography	12
55	Geophysics	12
57	Biology	12
581	Botany	12
591	Zoology	12
61	Medical sciences	12
632	Insect pests	12
666	Glass	12
669	Metallurgy	12
677	Textiles	12
678	Rubber	12
681.4	Optical instrument	12
77	Photography	12

Abstracts signed "E. R. A." are supplied by courtesy of the British Electrical and Allied Industries Research Association.

Abstracts signed "M.-V." are supplied by courtesy of the Metropolitan-Vickers Electrical Co. Ltd.

Erratum: Abstr. 1268, line 9: *for* seasonable, *read* seasonal.

VARIOUS SUBJECTS

1284 31 : 6(82) = 6

Analysis of the Argentine industry from an economical and dynamical point of view. DORFMAN, A. *Publ. Fac. Cienc. Fis.-Mat. La Plata*, 11, *pp.* 285–326, *Dec.*, 1942.—The author establishes various criteria, in the form of coefficients, for the assessment of the importance of an industry, based on man hours, motor power installed, etc. These coeff. are applied to the industries in the Argentine Rep. and the results exhibited in tables.

MATHEMATICS

1285 511.2

A case of the product of certain demlo-numbers. CHANDRATREYA, M. L., AND KAPREKAR, D. R. *J. Univ. Bombay*, 11, *pp.* 14–15, *Nov.*, 1942.

1286 511.29

An inequality in partitions. GUPTA, H. *J. Univ. Bombay*, 11, *pp.* 16–18, *Nov.*, 1942.

1287 512.12

On sets of integers which contain no three terms in arithmetical progression. SALEM, R., AND SPENCER, D. C. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 561–563, *Dec.*, 1942.

1288 512.52

Interpolation and summation formulae and the properties of factorials. I. SEN, D. K. *J. Univ. Bombay*, 11, *pp.* 22–36, *Nov.*, 1942.

1289 512.9 : 530.145.63

Pentads, tetrads, and triads of meson matrices. SCHRÖDINGER, E. *Proc. Roy. Irish Acad.*, 48*A*, *pp.* 135–146, *Jan.*, 1943.—The five-dimensional tensor-form condenses all 10 equations into 1 line.

1290 512.9 : 621.3.013.62 : 621.3.012.8

Equivalent circuits for oscillating systems and the Riemann–Christoffel curvature tensor. KRON, G. *Trans. Amer. Inst. Elect. Engrs*, 62, *pp.* 25–31, *Jan.*, 1943.—[Abstr. 1193 B (1943)].

1291 513.735.92 : 530.12

A note on isotropic manifolds. MOGHE, D. N. *J. Univ. Bombay*, 11, *pp.* 6–8, *Nov.*, 1942.—The paper brings out some properties of isotropic manifolds which have an application to the theory of relativity.

1292 513.761.6

A generalization of the projective geometry of linear spaces. CHERN SHIING-SHEN. *Proc. Nat. Acad. Sci., Wash.*, 29, *pp.* 38–43, *Jan.*, 1943.

1293 513.814

On the Euclidean connections in a Finsler space. CHERN SHIING-SHEN. *Proc. Nat. Acad. Sci., Wash.*, 29, *pp.* 33–37, *Jan.*, 1943.—It is proved by the method of equivalence that in a general Finsler space an infinite number of Euclidean connections can be defined, in which the connections defined by other authors are included as particular cases.

1294 513.83

On the lattice of open sets of a topological space. VAIDYANATHASWAMY, R. *Proc. Indian Acad. Sci. A*, 16, *pp.* 379–386, *Dec.*, 1942.

1295 517.5

On integral functions of infinite order. SHAH, S. M. *J. Univ. Bombay*, 11, *p.* 9, *Nov.*, 1942.

1296 517.5

On the relations between the lower order and the exponent of convergence of zeros of an integral function. SHAH, S. M. *J. Univ. Bombay*, 11, *pp.* 10–13, *Nov.*, 1942.

1297 517.65 : 517.947.2

Some applications of Marcel Riesz's integrals of fractional order. COPSON, E. T. *Proc. Roy. Soc. Edinb. A*, 61, 3, *pp.* 260–272, 1943.—An account is given of Riesz's generalization of the Riemann–Liouville integral of fractional order. It is shown that the new ideas introduced by Riesz may prove valuable in the theory of partial differential equations and in the theory of the wave equation in momentum space.

1298 517.941.91

Existence of periodic solutions for certain differential equations. LEFSCHETZ, S. *Proc. Nat. Acad. Sci., Wash.*, 29, *pp.* 29–32, *Jan.*, 1943.

See Abstr. 1297 517.947.2 : 517.65

See Abstr. 1356 518.3 : 532.542.1

1299 518.3 : 536.63 : 532.13

Specific heat and viscosity nomographs for calcium chloride brines. DAVIS, D. S. *Industr. Engng Chem.*, 34, *p.* 1532, *Dec.*, 1942.

1300 518.3 : 542.48

Nomographs for the absorption factor equation. CHASE, S. *Industr. Engng Chem.*, 34, *pp.* 1499–1501, *Dec.*, 1942.

1301 518.5 : 541.123.21

A slide rule for carbonate equilibria and alkalinity in water supplies. HIRSCH, A. A. *Industr. Engng Chem. (Analyt. Edit.)*, 14, *pp.* 943–946, *Dec.* 15, 1942.

1302 519.1

Some advances in the combinatory theory of quantification. CURRY, H. B. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 564–569, *Dec.*, 1942.

1303 519.271.3 : 620.11

Double sampling inspection in a manufacturing plant. KEELING, D. B., AND CISNE, L. E. *Bell Syst. Techn. J.*, 21, *pp.* 37–50, *June*, 1942.—The "average outgoing quality limit" double sampling plan involves the examination on a "go—no go" basis of a specified number of articles taken at random from a large group. The acceptance or rejection of this group is usually made on the basis of results obtained from the first sample alone, but if these results are not conclusive, an additional sample is examined before a decision is made. The type of articles to which this plan has been applied are products consisting of individual parts, sub-assemblies or completed apparatus which are the result of repetitive operations capable of considerable uniformity. Sampling tables are given and also control charts illustr. the application [See Abstr. 1159 (1941)]. A. W.

1304 519.272 : 620.11

Application of rank correlation to the development of testing methods. SCHWARZ, E. R., AND FOX, K. R.

Bull. Amer. Soc. Test. Mater., No. 119, *pp.* 21–24, *Dec.*, 1942.—[Abstr. 1169 B (1943)].

See Abstr. 1315 519.283 : 521.11

1305 519.283 : 616.9

The epidemic curve. II. WILSON, E. B., AND BURKE, M. H. *Proc. Nat. Acad. Sci., Wash.*, 29, *pp.* 43–48, *Jan.*, 1943.—[See Abstr. 534 (1943)]. Compares the results of Soper's approximation for the case where $A = 0$ with the results obtained previously.

1306 519.422

Natural isomorphisms in group theory. EILENBERG, S., AND MACLANE, S. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 537–543, *Dec.*, 1942.

1307 519.44

Determination of the subgroups of small index. MILLER, G. A. *Proc. Nat. Acad. Sci., Wash.*, 29, *pp.* 25–28, *Jan.*, 1943.

1308 519.443

Ordered groups. LEVI, F. W. *Proc. Indian Acad. Sci. A*, 16, *pp.* 256–263, *Oct.*, 1942.

1309 519.45 = 6

The automorphisms of the monomial group of 6th degree. SAGASTUME BERRA, A. E. *Publ. Fac. Cienc. Fis.-Mat. La Plata*, 11, *pp.* 207–214, *Dec.*, 1942.—An extension of the results obtained by Ore to include groups of 6th degree.

1310 519.5

Statistical metrics. MENGER, K. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 535–537, *Dec.*, 1942.

1311 519.52

Concerning intersecting continua. MOORE, R. L. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 544–550, *Dec.*, 1942.

1312 519.52

Concerning a continuum and its boundary. MOORE, R. L. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 550–555, *Dec.*, 1942.

1313 519.52

Concerning domains whose boundaries are compact. MOORE, R. L. *Proc. Nat. Acad. Sci., Wash.*, 28, *pp.* 555–561, *Dec.*, 1942.

ASTRONOMY. GEODESY

1314 521.04

Concerning the origin of chemical elements. GAMOW, G. *J. Wash. Acad. Sci.*, 32, *pp.* 353–355, *Dec.* 15, 1942.—The observed abundance of the light elements can be explained satisfactorily as due to contemporary nuclear processes taking place in the interiors of giant red stars or of main-sequence stars. The transmutation of the heavy elements is impossible under present cosmic conditions, and the explanation of their rel. abundances is sought in the conditions prevailing at an earlier epoch (2 or 3×10^9 yr. ago). It is suggested that the primitive superdense matter may have contained nuclei several times heavier than U, whose fission into 2 or 3 parts accompanied by emission of neutrons may have resulted in the present rel. abundances. A. HU.

1315 521.11 : 519.283

The statistics of the gravitational field arising from a random distribution of stars. II. The speed of fluctuations: dynamical friction: spatial correlations. CHANDRASEKHAR, S., AND NEUMANN, J. VON. *Astrophys. J.*, 97, *pp.* 1–27, *Jan.*, 1943.—A statistical analysis of the speed of fluctuations in the force per unit mass, F, acting on a star moving with a vel. v with resp. to the centroid of the near-by stars. The statistical problem has been solved on the assumptions of a uniform Poisson distribution of the stars and a spherical distribution of the velocities with resp. to the chosen local std. of rest. The various second moments of F are calculated and lead to an estimate of the mean life of the state F. The closely related problem of the correlations in F acting at 2 very close points in a system containing a random distribution of stars is considered. [See Abstr. 2233 (1942)].

1316 522.15 : 523.78

Preliminary results of observations made during the total eclipse of the Sun on Sept. 21, 1941. FESSENKOV, B. G. *J. Phys., U.S.S.R.*, 6, 1–2, *pp.* 1–5, 1942.—The apparatus used by the Russian expeditions is described. Clear weather favoured the observations and good flash spectra, coronal spectra and direct coronal photographs were secured. Photographs for determining the gravitational deflection of light were not so successful and may not prove measurable. Results obtained with a 2-prism spectrograph crossed with a Fabry–Perot interferometer suggest that the width of the red and green coronal lines is considerably less than previously believed. Direct photographs show that the coronal features were not symmetrical about the equator; a chaotic structure on the W. limb is probably correlated with a spot group which passed the central meridian 5 days before the eclipse, causing aurorae and a short-wave radio fading. A. HU.

1317 523.12

The Cepheid theory of the origin of the solar system. BANERJI, A. C. *Phys. Rev.*, 63, *pp.* 55–56, *Jan.* 1 *and* 15, 1943.—The oscillations of a pulsating star are no longer stable when terms of the order of the square of the amplitude are appreciable. In the author's theory of the origin of the solar system, unstable oscillations are set up tidally in a Cepheid by the close passage of another star. Matter of mass equal to that of the Sun is ejected from the parent Cepheid, together with a filament initially connecting the two. The planets are formed from part of this filament, and derive their angular momentum from the passing star. The Cepheid is also left with a planetary system. A. HU.

1318 523.51

A spectrographic study of meteorites. JOHNSON, W. W. A., AND NORMAN, D. P. *Astrophys. J.*, 97, *pp.* 46–50, *Jan.*, 1943.—Eighteen meteorites were investigated for the presence of 69 elements. 40 elements were found, 12 of which had not been reported by King. The spectrograms were taken by a jumping-plate technique that permitted estimates to be made of the rel. volatility of the elements found, all of which, with the exception of Al and Ti, vaporized in the order expected from considerations of their b.p. and abundances. The 2 iron meteorites contained less Ti than the stones.

1319 523.752 = 3

Flow of matter in solar prominences. II. Ascending motions. WALDMEIER, M., AND BECK, B. *Z. Astrophys.*, 21, *pp.* 286–294, 1942.—[See Abstr. 341 (1943)]. Measures of 19 knots in the eruptive

prominence of 18 Aug., 1941, are made on 31 exposures secured on the Arosa coronagraph betw. 0940 and 1023. The trajectories of the knots are shown as short straight lines, many of them parallel, at the junctions of which sudden changes of direction have occurred, alternately to right and to left. Distance/time diagrams are also made up of straight lines at the junctions of which sudden changes of velocity have occurred. The velocities change by non-integral factors varying from 0·46 to 2·63. It is concluded that the force which supports a prominence against gravity is unknown; and that the forces which cause the alterations of direction and velocity are probably indep. of one another and are more likely to originate inside the prominence than outside it. A. HU.

1320 523.755 : 550.385 = 3

Coronal intensity and geomagnetism. WALDMEIER, M. *Z. Astrophys.*, 21, *pp.* 275–285, 1942.—The appearance at the Sun's limbs of "*C*-regions" of abnormal intensity of the coronal line 5 303 Å is correlated with the occurrence about 7·4 days later (E. limb) or 6·2 days earlier (W. limb) of geomagnetic disturbances. The phenomena are associated in 10 out of 15 cases of observed coronal activity at the limb. On the assumption that all *C*-regions cause magnetic activity on passing the central meridian, this gives them a lifetime of 24 days. Coronal observations were possible at the appropriate times for 10 out of 20 magnetic storms in 1939 and 1940; in 7 cases *C*-regions could be associated with the storms, in 3 no such association is possible. This agrees with the lifetime previously found and suggests that all 10 storms were associated with the central meridian passage of *C*-regions. The *C*-regions are not associated with photospheric disturbances, though they appear only in the spot zones. It is suggested that they are identical with the *M*-regions postulated to account for periodic magnetic storms by long-continued corpuscular emission. A. HU.

See Abstr. 1316 523.78 : 522.15

1321 523.82 = 3

Photography of stars in the immediate neighbourhood of the Sun. WALDMEIER, M. *Z. Astrophys.*, 21, *pp.* 269–274, 1942.—A rough calculation shows that in the coronagraph at Arosa (alt. 2 050 m.) the image of a first-magnitude star near the Sun's limb should be 5 times brighter than the scattered background light in good meteorological conditions. Images of flaws in the field lens, which are normally formed in the final picture, are eliminated by rotating the lens at 3 r.p.s. around its optical axis. The field of view is limited to a radius of 1°; amongst first-magnitude stars only α Leon is as close to the ecliptic as this. The conjunction of 22 Aug., 1941, was suitable for photographing this star, as the nearest approach was at midday; a 15 sec. exposure at 1130 was successful. The application of the method to measuring the gravitational deflection of light is discussed. A. HU.

1322 523.852.3 : 523.872

Nuclear emission in spiral nebulae. SEYFERT, C. K. *Astrophys. J.*, 97, *pp.* 27–40, *Jan.*, 1943.—Spectrograms of dispersion 37–200 Å/mm. have been obtained of 6 extragalactic nebulae with high-excitation nuclear emission lines superposed on a normal G-type spectrum. The stronger emission lines visible in planetaries appear in the spectra of the 2 brightest spirals observed. The observed rel. intensities of the emission lines exhibit large variations from nebula to nebula. All the lines are broadened, presumably by Doppler motion, by amounts varying up to 8 500 km./sec.; some exhibit strong asymmetries, usually in the sense that the violet side of the line is stronger than the red. Absorption min. are found in certain of the stronger emission lines in some spirals. Measures of wavelength and equivalent width suggest that these arise from the G-type spectra on which the emissions are superposed. The max. width of the Balmer emission lines seems to increase with the abs. magnitude of the nucleus and with the ratio of the light in the nucleus to the total light of the nebula. A. HU.

1323 523.855 : 535.214

Effects of radiation pressure on cosmic dust. MORGAN, F. P. *J. Roy. Astr. Soc. Can.*, 36, *pp.* 441–444, *Dec.*, 1942. *Addendum in Jan.*, 1943.—Assuming a particle size of 3×10^{-6} in. for interstellar dust, the author shows that radiation pressure balances gravitation in the neighbourhood of a star with a mass/luminosity ratio of 3 times that of the Sun. The average star is much less massive than this, so that only absorption and the gravitational effect of the dust itself prevent expulsion of the particles from the Galaxy. In elliptic nebulae the dust avoids the centre and increases in density towards the outer regions at a rate which compensates for the decreasing star density; hence the uniform rotation period and colour index. In spirals, the high proportion of giants causes stars and dust to separate almost completely, and the author suggests that there must be 2 invisible arms of dust midway between the star zones. Further from the nucleus the rotational lag which causes the coiling results in intermingled star clouds and dark nebulae, as in the solar neighbourhood. A. HU.

1324 523.872

On the existence of a third component in the system 70 Ophiuchi. REUYL, D., AND HOLMBERG, E. *Astrophys. J.*, 97, *pp.* 41–45, *Jan.*, 1943.—Photogr. observations at the Leander McCormick Obs. give some anomalies that may be explained by the assumption of a third body. The perturbations have a period of 17 years and an amplitude, in X and Y, of 0″·015. The mass of the invisible companion amounts to 0·01 solar units.

See Abstr. 1322 523.872 : 523.852.3

1325 523.877

The continuous spectrum of model stellar atmospheres. WILLIAMSON, R. E. *Astrophys. J.*, 97, *pp.* 51–64, *Jan.*, 1943.—On the assumption that atomic H and the H^- ion are the only sources of continuous opacity in stellar atmospheres, the properties of the continuous spectra of 12 model atmospheres are investigated. Colour temperatures and magnitudes of the Balmer and Paschen discontinuities are computed for each. Comparison of the calculated values of the Balmer discontinuity with observations indicate an electron pressure of 10^3 bar for A stars and a somewhat smaller value for F stars. Graphs of the reci-

procal colour temperature in 3 spectral regions as a function of the reciprocal effective temperature show that the agreement of theory and observation is improved by using more recent absorption coefficients for H^-. In general, the agreement with the observations is less satisfactory in the longer wavelengths.

A. HU.

PHYSICS: GENERAL

1326 53.08 : 537.313

A demonstration of independent measurement. CAMPBELL, N. *Proc. Phys. Soc., Lond.*, 55, *pp.* 98–102, *March*, 1943.—The switching of a parallel circuit with ammeters in the main circuit and 2 out of 3 branches, the ammeters being initially unscaled, is used with switches and concealed connections to demonstrate that on observed magnitudes alone $2+2=4$ (due of course to the shunting effect of the unmeasured branch current). The idea is to bring home to the student that physical measurements depend for the most part on $2 + 2$ being equal to 4, which is true of some magnitudes but not of others, e.g. densities. G. F. F.

1327 530.12

The equations of fit in general relativity. NARLIKAR, V. V., AND VAIDYA, P. C. *Curr. Sci.*, 11, *pp.* 390–391, *Oct.*, 1942.

1328 530.12

On a lacuna in the treatment of internal solutions in general relativity. VAIDYA, P. C., NARLIKAR, V. V., AND PATWARDHAN, G. K. *Curr. Sci.*, 11, *p.* 391, *Oct.*, 1942.

See Abstr. 1291 530.12 : 513.735.92

1329 530.12 : 531.18

Kinematical theory and general relativity. MOGHE, D. N. *J. Univ. Bombay*, 11, *pp.* 1–5, *Nov.*, 1942.

See Abstr. 1483 530.12 : 538.3

See Abstr. 1289 530.145.63 : 512.9

1330 530.15 : 538.3

Newton's third law and electrodynamics. KELLER, J. M. *Amer. J. Phys.*, 10, *pp.* 302–307, *Dec.*, 1942.—The apparent failure of Newton's third law in its application to a system of 2 charged bodies in motion can be overcome by considering the system to consist not only of the 2 charges but also of the field. It is shown that, in the absence of external forces, the total momentum of the system (charge + field) is const.

A. J. M.

See Abstr. 1329 531.18 : 530.12

See Abstr. 1406 531.19 : 535.343 = 3

1331 531.224

The boundary couples in thin plates. STEVENSON, A. C. *Phil. Mag.*, 34, *pp.* 105–114, *Feb.*, 1943.—In continuation [see Abstr. 51 (1943)] the method is instrumental in revealing an error in Love's and Rayleigh's treatment of curvilinear co-ordinates. Special attention is paid to the simplifications introduced at a boundary by the boundary conditions, notably in the case of a clamped plate. The complex potentials are found for a thin clamped plate of which the boundary curve is a regular curvilinear polygon. G. E. A.

1332 531.225

The torsion of a fluted column. STEVENSON, A. C. *Phil. Mag.*, 34, *pp.* 115–120, *Feb.*, 1943.—Considers briefly the torsion of a cylinder of simply-connected cross-section by an extension of a method used previously [Abstr. 3066 (1938)]. The method is illustrated by applying it to the problem of a grooved or fluted column with a cross-section of which the boundary is the regular curvilinear polygon of n sides. [See Abstr. 1331 (1943)].

1333 531.56 : 623.55 = 3

A.A. controlling devices. KUHLENKAMP, A. *VDI [Z. Ver. dtsch. Ing.]*, 86, *pp.* 417–429, *July* 11, 1942.—An illustrated survey of devices serving for determining the front allowance in anti-aircraft gunnery. Two diff. principles are used, the linear method and the method based on angular velocities. The linear method may be based on reproducing geometrically the movement of the target with polar or rectangular, moving or stationary, co-ordinates. It may also be based on finding the mathematical relations betw. the values describing the movement of the target and the allowance and then evaluating the latter by means of calculating gear. Practical examples are given for all different methods. R. N.

See Abstr. 1551 531.7 : 548 = 3

See Abstr. 1503 531.71 : 677.31 : 539.216.1

1334 531.717 : 539.231

Measurement of thickness of fired-on gold coatings. BALLARD, K. H. *Industr. Engng Chem.* (*Analyt. Edit.*), 14, *pp.* 868–869, *Nov.* 15, 1942.—A jet-test method for measuring the thickness of liquid bright and burnish gold coatings on ceramics and 2 independent standardization methods for determining the stripping factors of the NH_4I–I–HCl–Gardinol reagents have been developed.

1335 531.717.1 : 539.215

Measuring intercept sphericity of sand grains. RITTENHOUSE, G. *Amer. J. Sci.*, 241, *pp.* 109–116, *Feb.*, 1943.—A measuring wedge, by which 3 mutually perpendicular dia. of sand grains may be measured is described. From these 3 dia. the intercept sphericity, the breadth/length ratio and the flatness ratio may be determined. The applicability of intercept sphericities to particles having euhedral form, cleavage or parting is discussed and the advantages of 3-dimensional measurements of sphericity are outlined.

1336 531.724 : 541.183.26 : 621.385.1.032.216

Surface area of oxide-coated cathodes by adsorption of gas at low pressures. WOOTEN, L. A., AND BROWN, C. *J. Amer. Chem. Soc.*, 65, *pp.* 113–118, *Jan.*, 1943.—[Abstr. 1392 B (1943)].

1337 531.733

Rapid determination of very small gas flows. SILVERMAN, L., AND THOMSON, R. M. *Industr. Engng Chem.* (*Analyt. Edit.*), 14, *p.* 928, *Dec.* 15, 1942.—The principle of the method is the formation and measurement of soap bubbles measured at a capillary tip. The apparatus consists of a small capillary tip, a 3-way stopcock, a stop watch, a magnifying glass and an illuminated scale.

1338 531.75 : 541.25 : 548 = 3

Precision pyknometric method for liquids and solids. IV. New determination of the density of pure potassium chloride, potassium bromide and sodium bromide at 0°C. BATUECAS, T., AND FERNÁNDEZ-ALONSO, J. I.

Z. phys. Chem. A, 190, *pp.* 272–277, *April*, 1942.—With the method previously described [Abstr. 439, 3487 (1938)] the densities of pure KCl, KBr and NaBr at 0°C. were determined and the values of mol. vol. and of the true lattice const. for these substances and for calcite and NaCl are tabulated. R. N.

1339 531.752

Simple automatic and recording balance. MULLER, N. W., AND PECK, R. E. *Industr. Engng Chem. (Analyt. Edit.)*, 15, *pp.* 46–48, *Jan.* 15, 1943.—The instrument maintains the balance arm at equilibrium by reeling in or playing out sufficient chain to counteract changes in sample weight. The chain mechanism is actuated by an energized pointer located above the knife edges. The pointer makes contact with either of 2 adjustable plates set 0·5 cm. apart, which in turn are connected to relays operating the clockwise and counterclockwise circuits of a small rotor. The recording mechanism is integral with the chain reel and a moving pen follows changes in weight continuously.

See Abstr. 1399 531.756 : 535.324

1340 (531.781 + 621.317.31) : 621.791.763 : 621.367

Device for measuring tip force and current in spot welding. WOLFE, H., AND POWELL, R. W. *Weld. J.*, *pp.* 293s–296s, *June*, 1942.—[Abstr. 1379 B (1943)].

1341 531.787 : 532.532 : 621.317.39

On the application of the electrical analogy method to pressure distribution under weirs with cavities. MIDHA, D. C., AND VAIDHIANATHAN, V. I. *Proc. Indian Acad. Sci., A*, 16, *pp.* 237–239, *Oct.*, 1942.—[Abstr. 1297 B (1943)].

1342 531.787.7

Practical fluid metering. I. LINFORD, A. *Iron and Steel*, *pp.* 246–250, *March*, 1943.—The principle of operation of differential pressure-generating devices is explained and details are given of the orifice plate, the Venturi tube and the nozzle and of their various applications. Several forms of U-tube manometer incl. a commercial type of self-recording and integrating instrument are described. For very small pressures a ring balance meter is advised. M.-V.

1343 531.788.12

An accurate high-sensitivity apiezon oil McLeod gauge. BANNON, J. *Rev. Sci. Instrum.*, 14, *pp.* 6–10, *Jan.*, 1943.—The reservoir is in gas communication with the bulb, and the oil is displaced by a plunger externally controlled. The bulb has a vol. of 300 cm.^{3} and the capillaries have a bore dia. of 1·44 mm. For single measurements at pressures of 10^{-3}, 10^{-4}, 10^{-5} and 10^{-6} mm. Hg the gauge is accurate to about 1, 2, 8 and 25% respectively. The equiv. compression ratio is $3·5 \times 10^{-7}$. To degas the oil it is necessary to raise it about 5 times, for ½ hr. periods, to the freely vaporizing state while the diffusion pumps are in operation. Erratum, ibid., p. 77, March, 1943.

See Abstr. 1359 532.13 + 539.4 + 532.61] : 576.3

See Abstr. 1299 532.13 : 536.63 : 518.3

See Abstr. 1547 532.13 : 541.24 = 3

1344 532.13 : 666.1/.2

The viscosity and working characteristics of glasses. I. The viscosity of some commercial glasses at temperatures between approximately 500° and 1 400°. BOOW, J., AND TURNER, W. E. S. *J. Soc. Glass Technol.*, 26, *pp.* 215–240(*T*), *Oct.*, 1942.—The viscosities of 24 glasses, 3 of them synthesized from pure materials and 21 of different types employed commercially, have been determined by 2 precision methods, the Margules method for 750°–1 400°, and a fibre extension method for 500°–800°. From the results, combined with data obtained by other workers, factors have been derived for the oxides SiO_2, Al_2O_3, Fe_2O_3, CaO, MgO, Na_2O and PbO by which, within prescribed limits of composition, the viscosities of glasses containing them can be calculated.

1345 532.13 : 677.47

The fluidity of nylon solutions in *m*-cresol: measurement of chemical damage in nylon textiles. BOULTON, J., AND JACKSON, D. L. C. *J. Soc. Dy. Col., Bradford*, 59, *pp.* 21–26, *Feb.*, 1943.—A viscosimetric method for the evaluation of chemical damage in nylon is proposed. *m*-cresol solutions of nylon exhibit Newtonian flow and show a Neale–Farrow viscosity/conc. relationship in which the const. have the values shown for a conc. range of 3·0% to 10·0% $1/c = (0·357/\log V) - 0·105$. Suitable dimensions for an efflux-type viscometer are given, and a routine method is specified for the measurement of nylon fluidities. Data for degradation due to light exposure and acid attack are given, and a smooth relation is shown to exist in both cases between tensile strength and fluidity. Reproducibility and interpretation of fluidity results are critically examined.

1346 532.133 : 541.182

Action of light on cellulose. MONTONNA, R. E., AND WINDING, C. C. *Industr. Engng Chem.*, 35, *pp.* 214–216, *Feb.*, 1943.—The equation $\eta_r = 1 + kc + k^1c^2$ describes the viscosity behaviour of dilute solutions of cellulose acetate. An easy and rapid method for obtaining the lim. sp. viscosity is described.

1347 532.133 = 3

Temperature function of viscosity exemplified by solutions of aniline-formaldehyde resins in cresol. SCHEELE, W., STEINKE, L., AND AVISIERS, I. *Kolloid Z.*, 95, *pp.* 74–81, *April*, 1941.—The temperature function of viscosity is discussed for some of the solutions previously investigated [Abstr. 2276 (1942)]. Betw. 40° and 90°C. the Andrade–Sheppard equation is valid. The const. of this equation are in linear relation to conc. By extrapolating the lines of $\log 1/\eta$ or $\log 1/\eta_r$ *v.* $1/T$ for different conc. a common point of intersection was found and the significance of its co-ordinates are discussed. R. N.

1348 532.137

Viscosity of starches. Determination in a rotating-cylinder viscometer. BARHAM, H. N., WAGONER, J. A., AND REED, G. N. *Industr. Engng Chem.*, 34, *pp.* 1490–1495, *Dec.*, 1942.—A modified rotating-cylinder viscometer, suitable for viscosity measurements of starch pastes, consists principally of a rotating, doughnut-shaped solution cup and a free cylinder concentric with and suspended into the solution cup. Viscosity is measured by evaluating the

restoring torque which must be applied to prevent the suspended cylinder from rotating.

1349 532.137

Starch viscosity or strength. MORGAN, W. L., AND VAUGHN, N. L. *Industr. Engng Chem.*, 35, *pp.* 233–238, *Feb.*, 1943.—The fluidity funnel commonly employed and the experimental factors affecting its use are examined. The strength funnel is not a true viscometer, and the strength scale varies in its relation to viscosity.

1350 532.14 + 535.324 + 535.563 + 541.123.2

Physical properties of terpenes. I. The system α- and β-pinene. FUGUITT, R. E., STALLCUP, W. D., AND HAWKINS, J. E. *J. Amer. Chem. Soc.*, 64, *pp.* 2978–2981, *Dec.*, 1942.—The densities, refr. indices and optical rotations for α- and β-pinene and their mixtures were determined. The v.p./temp. relations of α- and β-pinene were measured from 15 to 80 mm. The vapour/liquid equilibrium composition data for mixtures of α- and β-pinene at 20 mm. pressure were determined.

1351 532.14 + 535.324] : 536.49

Density and refractive index of cumene. TROYAN, J. E. *J. Amer. Chem. Soc.*, 64, *p.* 3056, *Dec.*, 1942.

See Abstr. 1527 532.14 : 535.324 : 541.123.31

1352 532.5 = 3

On present-day flow research. SÖRENSEN, E. *VDI* [*Z. Ver. dtsch. Ing.*], 86, *pp.* 435–438, *July* 11, 1942.—A brief report on a symposium at which the following papers were read: Non-stationary flow phenomena in motors, Eichelberg, G.; Non-stationary machine flow, Schultz-Grunow, F.; On the theory of plane gas waves of large amplitude, Pfriem, H.; The in-flow with plane slits, Hahnemann, H.; Measurement of packing-gland losses, Hartmann, W.; Flow phenomena in practically made packing parts, Hutarew, G.; The behaviour of blade profiles in the vicinity of sound velocity, Busemann, A.; The accuracy of measurement in steam-turbine research, Jaroschek, K.; The regularities of free turbulence, Reichhardt, H.; Graphic-analytical treatment of the movement in branched pipe lines, Reyl, G. R. N.

1353 532.525 : 534.413

The symmetrical vortex street in sound-sensitive plane jets. SAVIC, P., AND MURPHY, J. W. *Phil. Mag.*, 34, *pp.* 139–144, *Feb.*, 1943.—In a previous paper [Abstr. 2375 (1941)] it was concluded that once the initial periodic disturbance is set up in the jet, the motion develops in the sense of the Tollmien–Hollingdale criterion for instability [Abstr. 980 (1940)]. Discussion leads to the result that 2 types of neutral oscillation can exist in a plane jet, namely those of the symmetrical and alternate "streets." The theory as applied to the production of edge tones agrees with the mechanism proposed by Brown.

G. E. A.

1354 532.525 : 621.176

Some two-dimensional aspects of the ejector problem. GOFF, J. A., AND COOGAN, C. H. *J. Appl. Mech.*, 9, *A*151–*A*154, *Dec.*, 1942.—[Abstr. 1183 B (1943)].

1355 532.528

The nature of the destructive action of cavitation. KORNFELD, M., AND SUVOROV, L. *J. Phys., U.S.S.R.*, 6, 1–2, *pp.* 75–92, 1942.—The singing of a kettle, explained by the collapse of steam bubbles, has led to the explanation of the erosion of ship propellers, etc. The mechanism of the action as described by Cook and Rayleigh indicates the possibility of the existence of great pressures. In the authors' experiments cavitation is produced by a Ni tube oscillator vibrating at resonant frequency 7 500 in water. The short specimen under test was screwed into the upper end of the vertical oscillator, and the shape, vibrations and behaviour of the bubbles formed are discussed. The bubbles lose stability on attaining a dia. of 0·5 mm. and have destructive properties, boring through Al leaf, in a few min. The erosive action of cavitation is caused by the pressure due to the direct blows of the liquid. In the case of ship propellers, unstable surface cavities play the most important rôle, and a rubber covering for the propeller is suggested as a protection. The vibrations of the screw and its blades may lead to surface cavitation with very strong erosive action. G. E. A.

See Abstr. 1341 532.532 : 531.787 : 621.317.39

1356 532.542.1 : 518.3

Nomograph for pressure drop in isothermal flow of compressible fluids. THOMSON, G. W. *Industr. Engng Chem.*, 34, *p.* 1485, *Dec.*, 1942.

1357 532.542.1 : 669.13

The fluidity of cast iron. BURGESS, G. *Found. Tr. J., pp.* 197–203, *March* 11, 1943.—A method of measuring the fluidity of cast iron using a spiral run from the centre is described. The fluidity is ∝ the length of spiral cast. The influences of temperature, composition and amount of oxide skin are discussed both in the light of actual experience and of controlled laboratory experiments. M.-V.

1358 532.59 : 551.351.2

Waves as a sand-transporting agent. GRANT, U. S. *Amer. J. Sci.*, 241, *pp.* 117–123, *Feb.*, 1943.—Studies of the fluctuations in the amount of sand on the beaches and adjacent shallow sea floors of S. California together with the variations in wave size and type prove a direct relationship betw. these phenomena. There is proof of a differential in the velocity of the to and fro movement of water particles in oscillatory waves which, together with mass transport, furnishes the mechanics for the shoreward movement of loose sediment present in the shallow offshore zone.

1359 532.61 + 532.13 + 539.4] : 576.3

Some physical properties of living matter. NORRIS, C. H. *J. Phys. Chem.*, 46, *pp.* 1111–1117, *Dec.*, 1942.

1360 532.612 : 532.77

The surface tension of solutions of electrolytes as a function of the concentration. IV. Magnesium sulphate. JONES, G., AND RAY, W. A. *J. Amer. Chem. Soc.*, 64, *pp.* 2744–2745, *Dec.*, 1942.—The apparent rel. surface tensions of aq. solutions of $MgSO_4$ were measured from 0·0001–2 molar at 25·00°. At extreme dilution $MgSO_4$ gives a min. in the surface-tension/conc. curve. This type of min. has been observed for all of the other salts in this series [Abstr. 1250 (1942)]. At moderate and high conc. $MgSO_4$ increases the surface tension of water linearly with conc. and behaves as a typical capillary-inactive substance.

1361 532.612.4

Metallic drops. MAHAJAN, L. D. *Sci. and Cult.*, *pp.* 239–240, *Nov.*, 1942.—[See Abstr. 1027 (1939), 73, 4791 (1933)].

1362 532.612.4

Surface tensions of methane-propane mixtures. EINAUG, C. F., AND KATZ, D. L. *Industr. Engng Chem.*, 35, *pp.* 239–246, *Feb.*, 1943.—The surface tensions of the liquids in equilibrium with vapour were determined for the methane-propane system at -194°F. and 40–1 500 lb./in.^{2} The capillary-rise and drop-vol. methods were used in a glass-windowed equilibrium cell. Differences in results betw. these methods are explained by the high rates of drop formation in the drop-vol. method. A formula is developed which reproduces the methane-propane data within 0·1 dyne/cm. This formula may be applied to any mixture when the mol. wt., density and composition of each phase are known. Liquids in the entire critical region have very low surface tensions.

1363 532.612.4 : 536.423.15

Surface tension and vapour pressure. POLLARA, Z. *J. Phys. Chem.*, 46, *pp.* 1163–1167, *Dec.*, 1942. An equation relating the v.p. to the surface tension is proposed. From this an equation for the v.p. in terms of the critical const. and the b.p. is given. Eötvös's ratio is also given.

1364 532.612.4.08

Surface tension and its measurement. FERGUSON, A. *Endeavour*, 2, *pp.* 34–38, *Jan.*, 1943.—A simple method for measuring, with great accuracy, the surface tension of small quantities of liquids is described and an example of the results obtained illustrated. The general formula for the variation of surface tension with temperature is discussed, two types of simple apparatus for its exp. determination are described, and results obtained for a series of unassociated liquids are given. It is stated that, for associated liquids, a formula which permits extrapolation over the whole temperature range cannot, generally, be found. An equation for ordinary and heavy water is, however, shown to be confirmed by test results. Test results are also given for a number of liquid crystals. R. H. G.

1365 532.614.3 : 620.19

Theory of stress due to collapse of vapour bubbles in a liquid. SILVER, R. S. *Engineering*, 154, *pp.* 501–502, *Dec.* 25, 1942.—[Abstr. 1174 B (1943)].

1366 532.69

Surface-active agents. SNELL, F. D. *Industr. Engng Chem.*, 35, *pp.* 107–117 *and* 126–130, *Dec.*, 1942.—A general survey of the history, properties and multiple applications of the various surface-active agents known at present. A list of s.-a. agents manufactured in U.S.A. is added.

1367 532.696 : 541.183 : 669

Flotation kinetics. I-II. SCHUHMANN, R., JR., GAUDIN, A. M., AND SCHLECHTEN, A. W. *J. Phys. Chem.*, 46, *pp.* 891–910, *Nov.*, 1942.—An exp. approach is developed for quantitative evaluation of mineral behaviour during the froth-production step in the flotation method of separation. The froth carries air-adherent particles and leaves the bulk of the water-adherent particles behind in suspension. The method is based on the study of the flotation system in the steady state and the interpretation is aided by the introduction of 2 new criteria of flotation behaviour, i.e. sp. flotation rate (rate of flotation of the pulp constituent ÷ the wt. of that constituent in the pulp body of the flotation cell) which is directly related to the kinetics of particle-bubble attachment, and coeff. of mineralization (conc. of pulp constituent in the froth product ÷ conc. of that constituent in the pulp body) which is a significant measure of the kinetics of bubble levitation and froth draining. A study of the effect of size on the behaviour of galena particles indicates the existence of a critical size range in the flotation of galena in K ethyl xanthate as a collector. Particles coarser than this size-range vary in floatability, but finer particles appear equally floatable. A hypothesis on the state of aggregation of the particles is proposed to explain these phenomena. N. M. B.

1368 532.713 : 532.74

Studies on high-molecular-weight aliphatic amines and their salts. IX. The behaviour of various salts of dodecylamine in water, ethanol and benzene. HOERR, C. W., AND RALSTON, A. W. *J. Amer. Chem. Soc.*, 64, *pp.* 2824–2829, *Dec.*, 1942.—The colloidal nature of aq. solutions of these salts is demonstrated by a study of their osmotic coeff. Mol. association of dodecylammonium butyrate in benzene is discussed.

1369 532.72 : 541.182.2

Diffusion of solubilized dyes in water and through membranes. DEAN, R. B., AND VINOGRAD, J. R. *J. Phys. Chem.*, 46, *pp.* 1091–1098, *Dec.*, 1942.—Soaps and soap-like detergents and bile salts can dissolve water-insoluble lipoidal substances, thereby forming thermodynamically stable systems. There is evidence that solubilizers act only when they are capable of forming micelles, and the solubilization of water-insoluble organic dyes measures the micelles present. Diffusion of Orange OT and Yellow AB with Aerosol OT was investigated in H_2O and through cellophane. Results are discussed in rel. to the action of bile salts as promoters of fat hydrolysis. N. M. B.

1370 532.72 : 541.25

A study of the diffusion velocity of ovalbumin in relation to its molecular weight. FRIEDMAN, L., AND RAY, B. R. *J. Phys. Chem.*, 46, *pp.* 1140–1150, *Dec.*, 1942.—Exp. studies were carried out in sintered-glass membrane-type diffusion cells. The viscosities of the solutions were determined. The results are stated in equations yielding values for the dissymmetry and the mol. wt. of ovalbumin.

1371 532.72 = 3

On diffusibility and hydrolysis of yttrium and cerium (III) salts in aqueous solutions of different $[H^+]$. JANDER, G., AND MÖHR, H. *Z. phys. Chem. A*, 189, *pp.* 335–343, *Oct.*, 1941.—Of all trivalent bases those of rare-earth metals do not form higher aggregated products of hydrolysis. The same diffusion coeff. were found for all different values of *p*H. The measured values represent the true diffusion coeff. of the ions. R. N.

See Abstr. 1530 532.73 : 541.127

1372 532.739.2

Some isotherms of the system sodium-chromate–sodium-chlorate–water. RICCI, J. E., AND WELTMAN, C. *J. Amer. Chem. Soc.*, 64, *pp.* 2746–2748, *Dec.*, 1942.—Solubility determinations are reported for the system Na_2CrO_4-$NaClO_3$-H_2O at 19°, 25° and 50°. No evidence is found for any compound formation or solid solution between the 2 salts in this range.

1373 532.739.2

The solubility effect in solvents of low dielectric constant. II. A study of the solubility effect in benzene. VERNON, A. A., AND MASTERSON, J. P. *J. Amer. Chem. Soc.*, 64, *pp.* 2822–2823, *Dec.*, 1942.—An increase in solubility of the saturating salt was found and the rel. of this to multiple-ion phenomena is indicated.

1374 532.739.2

Solubilities of orthanilamide, metanilamide and sulphanilamide. KIENLE, R. H., AND SAYWARD, J. M. *J. Amer. Chem. Soc.*, 64, *pp.* 2464–2468, *Oct.*, 1942.

1375 532.739.2

The solubility of calcium oxalate monohydrate in pure water and various neutral salt solutions at 25°. MCCOMAS, W. H., JR., AND RIEMAN, W., III. *J. Amer. Chem. Soc.*, 64, *pp.* 2946–2947, *Dec.*, 1942.—The solubility of pure Ca oxalate in water and in solutions of NaCl, KCl, ammonium formate and Na_2SO_4 at 25° has been determined.

See Abstr. 1457 532.739.2 : 536.753 : 536.653

1376 532.739.2 : 541.132

The effect of *p*H on the solubility of calcium oxalate. MCCOMAS, W. H., JR., AND RIEMAN, W., III. *J. Amer. Chem. Soc.*, 64, *pp.* 2948–2949, *Dec.*, 1942.—The second ionization const. of oxalic acid was determined at ionic strengths from 0 to 1 in the presence of NaCl, KCl and NH_4Cl and ammonium chlorides. The solubility of Ca oxalate monohydrate in formate buffers of const. ionic strength was studied.

See Abstr. 1368 532.74 : 532.713

See Abstr. 1496 532.74 : 539.133

See Abstr. 1432 532.74 : 541.65 : 541.124 : 535.563

See Abstr. 1360 532.77 : 532.612

See Abstr. 1446 532.77 : 536.423.15

See Abstr. 1534 532.77 : 536.7 : 541.134

1377 532.77 : 536.7 : 678

Properties of rubber solutions and gels. HUGGINS, M. L. *Industr. Engng Chem.*, 35, *pp.* 216–220, *Feb.*, 1943.—The writer's theory of the thermodynamic properties of solutions of long-chain molecules is applicable to rubber solutions. Each rubber-solvent system is characterized by a const. which determines the dep. of the activity on conc. Equations for the determination of mol. wt. from osmotic pressure and cryoscopic data are presented.

See Abstr. 1528 532.771 : 541.124 = 3

1378 533.1.08

Practical gas-flow measurement. NORMAN, A. J. *Pap. Inst. Fuel*, 16, [18 *pp.*], 1943.—The theory and some of the difficulties encountered in the practical measurement of gas flow by (1) Pitot tubes (of std. and *Stauscheibe* forms), and (2) orifice plates a discussed. J. S. G.

1379 533.275

A device for calibrating small air pumps. OWI J. C. *Science*, 97, *pp.* 99–100, *Jan.* 22, 1943.—An pump of about 5 cm.³ per stroke forms a part of chemical absorption hygrometer and requires acc rate calibration. The unknown vol. of air is replac by an equal vol. of water; this is measured in a doul flask and valves operated until a reservoir is fu This vol. divided by the counted number of strol gives capacity in cm.³ per stroke. E. H. W.

1380 533.5

Notes on high-vacuum technique. BURROWS, *J. Sci. Instrum.*, 20, *pp.* 21–28, *Feb., and pp.* 77–7 *May*, 1943.—Deals with pumps, vacuum pipe lin detachable joints and jointing media, vacuum gaug and indicators, and avoidance and detection leaks. E. R.

1381 533.73

A note on the principle of adiabatic invarianc BHATNAGAR, P. L., AND KOTHARI, D. S. *Indian Phys.*, 16, *pp.* 271–275, *Oct.*, 1942.—The principle illustrated by examples of a compound pendulum, oscillating magnet and an electric oscillating circuit

SOUND. VIBRATIONS

1382 534.015.2 : 621.824 : 629.123.22

The effect of machinery torque variations on pr pulsive performance. PANAGOPOULOS, E. *Tra N.-E. Cst Instn Engrs Shipb.*, [23 *pp.*], 1943.—Relatio are obtained, giving the speed and thrust fluctuati and loss of energy for a simple 2-mass system, wi damping applied at the propeller and the engine. is explained how any system of concentrated mass can be reduced to an equiv. 2-mass system, and method is given for obtaining the damping facto from model exp. data. Examples are worked out.

1383 534.133 : 548.7

Force-constants and normal modes of the total symmetric vibrations in α-quartz at room temperatur SAKSENA, B. D. *Proc. Indian Acad. Sci. A*, 1 *pp.* 270–277, *Oct.*, 1942.—[See Abstr. 2985 (1940)] The force const. for α-quartz are calculated with th help of the 4 frequencies of vibration 207, 356, 46 and 1 082 belonging to the totally symmetric clas The agreement of calc. and obs. frequencies is close.

1384 534.143 : 539.433 : 678

Vibration properties of rubber-like materials Dependence on temperature. STAMBAUGH, R. I *Industr. Engng Chem.*, 34, *pp.* 1358–1365, *Nov* 1942.—An electrical vibrator for determining dynami properties of rubber-like materials is describe Dynamic mod., internal friction and dynamic resil ence are measured, from 30 to 100 c./s. and − 30 to + 120°C. for rubber, butadiene-acrylonitrile an butadiene-styrene copolymers, Thiokol, neoprene and gum rubber. Dynamic mod. and resilience fo these materials are indep. of frequency, interna friction is approx. $\propto 1/f$. Modulus decreases a temperature increases. The dep. of internal frictio on temperature follows the same exp. law as th viscosity of liquids. At critical temperatures sudde changes occur in the inter-molecular forces whic

use a transition from one curve to another. Resilience rises linearly with temperature and shows the time transition points.

1385 534.154 : 621.317.39

The measurement of torsional vibrations. STANSFELD, R. *J. Proc. Instn Mech. Engrs, Lond.*, 148, pp. 175–193, *March*, 1943. *Abstr. in Engineer, Lond.*, 174, *pp.* 77–79, *July* 24, *and pp.* 101–102, *July* 1, 1942, *and Engineering*, 154, *pp.* 178–180, *Aug.* 28, 1942.—[Abstr. 1298 B (1943)].

1386 534.213

Dispersion of elastic waves in solid circular cylinders. HUDSON, G. E. *Phys. Rev.*, 63, *pp.* 46–51, *Jan.* 1 *and* 5, 1943.—The theory of elastic vibrations in solid circular cylindrical rods of homogeneous isotropic materials is redeveloped from the general equations of elasticity. For any mode of vibration the ratio of the vel. of any elastic wave travelling along the rod to the vel. c_0 of shear waves is the same for any 2 rods whose Poisson ratios are equal and whose ratios of circumference to shear wavelength are equal. If the vel. of propagation for any particular mode remains $< c_0$ as the frequency or radius is increased indefinitely, this vel. approaches that of Rayleigh surface waves; if it remains $> c_0$ the vel. $\rightarrow c_0$.

1387 534.22

Dispersion of sound velocity in some alcohols. RENDALL, G. R. *Proc. Indian Acad Sci. A*, 16, *pp.* 369–378, *Dec.*, 1942.—Adiabatic compressibility of 6 alcohols at different temperatures were determined by a modified form of Tyrer's piezometer. The densities at different temperature were found by a specially designed pyknometer. From these data the theoretical acoustic velocity at sonic frequency is calculated, $v = 1\sqrt{\rho\beta_\varphi}$. The ultrasonic velocities are determined for different temperatures at 2 000 kc./sec. There is evidence of dispersion in all the alcohols except *n*-propyl alcohol. In *n*-butyl alcohol the ultrasonic velocity is $<$ the sonic, while in all the other cases the ultrasonic velocity is higher.

See Abstr. 1353 534.413 : 532.525

1388 534.61

Accurate sound-measuring equipment aids in the reduction of unwanted noise, as well as in the production of desired sounds. MIKELSON, W. *Gen. Elect. Rev.*, 45, *pp.* 685–690, *Dec.*, 1942.—Describes the measurement of total sound with the sound-level meter. The terms in use are listed and explained, and their units are given. A distinction is made betw. sound intensity level (db above 10^{-16} W/cm.^{2}) and sound level, an instrument measurement in db. In the sound-level meter the receiver is a microphone actuated by sound pressure. The voltage generated is amplified and the instrument reading is added to the range reading, there being 3 ranges, corresp. to the 40-, 70- and 100-phon loudness-level contours, respectively. A special acoustic calibrator is used to generate a std. sound, and the method of adding sound levels, when sounds of different intensity levels are sounded together, is explained. G. E. A.

1389 534.83

Sound insulation. ALLEN, W. *J. Roy. Soc. Arts*, 91, *pp.* 135–147, *Feb.* 5, 1943.—The attainment of quiet, an urban problem, requires reduction of noise at the source, house-planning and structural techniques. The last two of these are discussed in detail. It is usual to assume that a reduction of 5 phon or db is required to secure an appreciable improvement and that a decrease of 10 would represent halving the noise. Also, if the distance from the source is doubled there is a loss of 6 db. In building a block of houses the cruciform shape is better than the hollow square which offers the lowest standard of quiet. The cul de sac has its advantages, so also have high buildings; at the top of a 20-storey building the reduction would be at least 20 db. When sound is generated in a room, its transmission to neighbouring rooms through walls, floor and ceiling can be reduced or prevented by using measures of discontinuity in these structures and the techniques employed in such cases are described with the aid of diagrams. G. E. A.

OPTICS

1390 535.13 = 3

Remark on the work by O. Schriever: Bringing the electromagnetic theory of reflection and refraction into conformity with the physical processes. LETTOWSKY, F. *Ann. Phys., Lpz.*, 42, 1, *pp.* 63–64, 1942.—[See Abstr. 3031 (1942)]. The law of refraction with complex angle is shown to be verified. H. G. S.

See Abstr. 1323 535.214 : 523.855

1391 535.231.3 = 3

A remark on the laws of black-body radiation. CSÁZÁR, E. *Naturwissenschaften*, 30, *pp.* 265–266, *April* 24, 1942. H. G. S.

1392 535.241.33 : 621.316.722.077.4

Electronic voltage regulator for precise densitometric measurements. DIETERT, H. W., AND HASLER, M. F. *J. Opt. Soc. Amer.*, 33, *pp.* 45–49, *Jan.*, 1943.—[Abstr. 1277 B (1943)].

1393 535.241.33 : 621.316.722.077.4

Voltage regulator for a densitometer lamp. PARSONS, S. L. *J. Opt. Soc. Amer.*, 32, *pp.* 153–155, *March*, 1942.—[Abstr. 1276 B (1943)].

1394 535.243-1

Applications of near infra-red spectrophotometry. STEARNS, E. I. *J. Opt. Soc. Amer.*, 33, *pp.* 27–30, *Jan.*, 1943.—The commercial G.E. spectrophotometer has been modified to afford automatic recording over the range 375–1 200 mμ. This is useful in the analysis of colourless materials, the identification of dyes and the formulation of infra-red paints.

1395 535.247.4 : 541.127

A photo-colorimetric study of the oxidation of nitric oxide at low pressures. SMITH, J. H. *J. Amer. Chem. Soc.*, 65, *pp.* 74–78, *Jan.*, 1943.—Describes a photo-electric colorimetric method for following the rise in conc. of NO_2 as O is added to NO. The method was used at moderately h.p. and at l.p. At very low pressures adsorption and surface effects greatly affect the reaction rate. The effect of water vapour was investigated. J. W. T. W.

1396 535.247.4 : 621.326.73

Photocell photometry of reflex reflectors. LITTLE, W. F., AND PARKER, A. E. *Illum. Engng, N.Y.*, 37, *pp.* 789–797, *Dec.*, 1942.—[Abstr. 1330 B (1943)].

See Abstr. 1474 535.3 : 537.531

1397 535.312 : 535.326

Reflection of light by a periodically stratified medium. RAMACHANDRAN, G. N. *Proc. Indian Acad. Sci. A*, 16, *pp.* 336–348, *Nov.*, 1942.—An expression for the reflection from a medium consisting of *n* stratifications is derived. The sharpness of the principal max. cannot be indefinitely increased by increasing the number of stratifications, but the width has a min. lim. value, which depends only on the reflecting power of the stratifications. There exist a number of secondary max. in the interval betw. the primary max., and these show a marked difference in their intensities on either side of a principal max.

1398 535.32 : 541.65

The molar dispersion and refraction of free and bonded ions. BAUER, N., AND FAJANS, K. *J. Amer. Chem. Soc.*, 64, *pp.* 3023–3034, *Dec.*, 1942.—The difference betw. the molar refraction for the Na *D* line and that extrapolated to infinite wavelength is used as measure of the molar dispersion. The molar dispersion for free gaseous ions of the noble-gas type is obtained by appl. the square rel. to the corresp. values of molar refraction found previously and to experimental data. The molar dispersion is more sensitive to changes in the forces acting on the electronic systems of ions and molecules than the molar refraction.

See Abstr. 1351 535.324 + 532.14] : 536.49

See Abstr. 1350 535.324 + 535.563 + 541.123.2 + 532.14

1399 535.324 : 531.756

Refractive indices and densities of normal saturated fatty acids in the liquid state. DORINSON, A., MCCORKLE, M. R., AND RALSTON, A. W. *J. Amer. Chem. Soc.*, 64, *pp.* 2739–2741, *Dec.*, 1942.—The refr. indices of the normal saturated fatty acids, from caproic to stearic inclusive, are determined at 20°–80°. For each acid the refr. indices are straight-line functions of temp. with an abrupt change of slope at 40°. The densities at 80° are also determined. Molar vol. and molar refractivities for the homologous series are computed and shown to be linear with resp. to the number of C atoms in the chain.

See Abstr. 1527 535.324 : 532.14 : 541.123.31

See Abstr. 1397 535.326 : 535.312

1400 535.33

Preparation of purified inorganic compounds for use in spectrographic standards. HUGHES, R. C. *J. Opt. Soc. Amer.*, 33, *pp.* 49–60, *Jan.*, 1943.—The need for specially purified compounds for use in the preparation of stds. for spectrographic analysis of agricultural materials is discussed and the sp. requirements which these compounds should meet are detailed. Methods suitable for the preparation of purified compounds of Mg, Ca, K, Na and Si are described in detail. The rel. efficiency, convenience and cost of various methods is compared and the probable usefulness of other methods indicated. A. H.

1401 535.33.03 : 621.325.17

Time effects and arc intensities. HEMMENDINGER, H. *J. Opt. Soc. Amer.*, 32, *pp.* 149–153, *March*, 1942.—Continuing previous work [Abstr. 1825 (1941)] emission intensities in NiFe and NiCo alloys are studied with ref. to their value in spectrochemical analysis. Although intensity ratio of the two elements may be observed within ± 2% the figures are not necessarily reproduced on a subsequent test, the departures being ascribed to variation in composition of electrode tips as the arc burns. Such variation may go on progressively for 1 hr. or more with continuous arcs. Results with an intermittent arc, struck by a h.f. h.v. discharge and maintained for a brief time by d.c. on a motor-operated switching cycle, show appreciably less time effect. Further investigation is in progress. G. F. F.

1402 535.33.03 : 621.366

Electrical ignition of the spectrographic arc. BROCKMAN, F. G., AND HOCHGESANG, F. P. *Industr. Engng Chem.* (*Analyt. Edit.*), 14, *p.* 796, *Oct.* 15, 1942.—[Abstr. 1366 B (1943)].

1403 535.336.2 : 537.533.92

Ionization and dissociation by electron impact: normal propyl chloride and tertiary butyl chloride: isobutylene, propane and propylene. STEVENSON, D. P., AND HIPPLE, J. A. *J. Amer. Chem. Soc.*, 64, *pp.* 2766–2772, *Dec.*, 1942.—[See Abstr. 2882 (1942)]. The mass spectra are tabulated and briefly discussed. The appearance potentials of a few ions were measured. The vertical ionization potentials are given. The mass spectrum of isobutylene is given in detail.

See Abstr. 1477 535.336.2 : 537.533.92

1404 535.343 = 3

On light absorption of cobalt thiosulphate solutions. KISS, Á. VON, AND MAJOR, E. *Z. phys. Chem. A*, 189, *pp.* 364–372, *Oct.*, 1941.—The extinction curves of $CoSO_4$ and CoS_2O_6 solutions are determined at various conc. of dissolved substance and solvent and the constitution of the complexes and the mechanism of light absorption are discussed. R. N.

1405 535.343 = 3

On sulphur monoxide. Information on the absorption spectrum of sulphur monoxide. SCHENK, P. W. *Z. phys. Chem. B*, 51, *pp.* 113–119, *Jan.*, 1942.—Further exp. proof is given for the assumption that the absorption spectrum previously ascribed to a metastable state of S_2 is due to SO, a gaseous oxide of S obtained in certain processes, e.g. as a reaction product of S_2 and SO_2 in a glow discharge. [See Abstr. 4064 (1937)]. R. N.

1406 535.343 : 531.19 = 3

The gas equilibrium $2SO \rightleftarrows \frac{1}{2}S_2^{\times} + SO_2$. ZEISE, H. *Z. phys. Chem. B*, 51, *pp.* 120–125, *Jan.*, 1942.—[See Abstr. 1405 (1943)]. A quantum-statistical calculation is made which shows that the assumption of equilibrium between SO and the metastable $S_2^{\times}$ is not sufficient for explaining the differences obs. betw. chemical and spectroscopic results. R. N.

1407 535.343 : 541.651 = 3

On light absorption and constitution of organic compounds. I. Analysis of extinction curves of aromatic Schiff's bases. KISS, Á. VON, AND AUER, G. *Z. phys. Chem. A*, 189, *pp.* 344–363, *Oct.*, 1941.—The extinction is not an additive property of the component substances, nor does light absorption cause a common excitation of the total system of π-electrons of the molecule as the benzene core and the azomethene groups act as separate chromophores. Bands are shifted in the direction of longer waves by

the formation of new ring systems with conjugated double links. By protomeric transformations, local excitations of π-electrons are caused and ways for new absorption phenomena are opened connected with an increase of the partial bands. R. N.

1408 535.343 : 591.111 = 3

On the structure of proteins. CSOKÁN, P., AND LAKI, K. *Z. phys. Chem. A*, 190, *pp.* 278–286, *April*, 1942.—The light absorption in the ultra-violet range was measured for gel-like fibrin produced from fibrinogen of pig's blood. The transition from fibrinogen to fibrin is explained by the formation or the increase of H-bridges. The extinction curves were analysed and the mechanism of light absorption is discussed. R. N.

1409 535.343.2

Absorption spectra of some double salts containing cobaltous chloride. SCHULTZ, M. L., AND LILEK, E. F. *J. Amer. Chem. Soc.*, 64, *pp.* 2748–2751, *Dec.*, 1942.—The absorption spectra of crystals of two caesium cobaltous chlorides, dipyridinium cobaltous chloride, diquinolinium cobaltous chloride and diquinolinium cobaltous chloride monohydrate were measured. The same complex ion, $CoCl_4^{--}$, is present in all. A tentative analysis of the spectra of the crystals has been made, suggesting that the spectra may originate in coupled electronic-vibrational transitions.

1410 535.343.4

Some effects of solvents upon the absorption spectra of dyes. I. Chiefly polymethine dyes. SHEPPARD, S. E., NEWSOME, P. T., AND BRIGHAM, H. R. **II. Some dyes other than cyanines.** SHEPPARD, S. E., AND NEWSOME, P. T. *J. Amer. Chem. Soc.*, 64, *pp.* 2922–2946, *Dec.*, 1942.—The absorption spectrum of a merocyanine dye was determined for the gaseous state (*in vacuo*). The displacement of the absorption band (or bands) in various solvents is ref. to that *in vacuo*. With certain families of compounds, there is a definite correlation of the displacement (to longer waves) with: (*a*) the refr. index and dielectric const. for non-polar solvents; (*b*) the polar moment for polar solvents. With ionized (cyanine) dyes, no displacement is effected by change of polar moment, but changes occur in non-polar solvents of increasing refraction and dielectric strength. Theoretical considerations of the solvent effects are given in rel. to the structures of the dyes. The sensitivity of the absorption spectra of dyes to solvent influence is closely related to the resonance system of the dye, and may throw some light upon this.

1411 535.348

On the problem of the nature of pleochroic rings of small radii. FLEROV, G. N. *J. Phys., U.S.S.R.*, 6, 1–2, *pp.* 49–52, 1942.—Pleochroic rings in mica may be due to the fission of heavy nuclei (U and Th) by neutrons, or the spontaneous fission of these nuclei. The small-radius rings in U haloes are ascribed to the spontaneous fission of U [Abstr. 73 (1924) and 111 (1940)]. A. J. M.

See Abstr. 1537 535.37 : 541.143

1412 535.37 = 3

A remark on the action of fluxes with ZnS, CdS luminiscent substances. SCHLEGEL, H. *Naturwissenschaften*, 30, *p.* 242, *April* 17, 1942. H. G. S.

1413 535.37 = 3

On the effect of additional foreign substances on the luminescence of lucigenin. I. WEBER, K. *Z. phys. Chem. B*, 50, *pp.* 100–115, 1941. **II.** WEBER, K., AND OCHSENFELD, W. *Ibid.*, 51, *pp.* 63–74, *Jan.*, 1942.—The inhibiting or accelerating effect of foreign substances on fluorescence and chemiluminescence of lucigenin (N,N'-dimethyldiacridyliumnitrate) is investigated. In the case of chemiluminescence with inhibiting materials, either initial brightness alone or both initial brightness and sum of light are reduced. The effect may be due to the action on the excited molecules or on the exciting reaction. In some cases, especially with organic substances, inhibiting and accelerating may occur simultaneously. OsO_4, pyridine, piperidine and monovalent saturated alcohols have a purely catalytic effect. With alcohols this effect is a linear function of the number of C atoms. The influence of the conc. of brine and of peroxide on brightness and sum of light are investigated. Linearity exists between peroxide concentration and initial brightness. R. N.

1414 535.371

Fluorescent and phosphorescent paints. STUTZ, G. F. A. *Illum. Engng, N.Y.*, 37, *pp.* 798–806, *Dec.*, 1942.—Describes the properties and some of the applications of both fluorescent and phosphorescent dyes and paints and the types of ultra-violet lamps which may be used to activate them. J. W. T. W.

1415 535.371

Fluorescence notation. MENT, J. DE. *Phil. Mag.*, 34, *p.* 212, *March*, 1943.—A proposal for a notation with which to denote the simple fluorescence of a substance, its exciting wavelength, and the conditions, e.g. solvent, under which the examination was conducted. For riboflavin in water, for example, the notation would read:

$$\left[\Lambda_{H_2O}^{3650}\right] = \text{bright green.}$$

1416 535.371 : 621.327.43

Fluorescent fatigue. MARDEN, J. W., AND BEESE, N. C. *Illum. Engng, N.Y.*, 37, *pp.* 807–812, *Dec.*, 1942.—[Abstr. 1333 B (1943)].

1417 535.375.5

The Raman spectrum of sulphur under high dispersion. NORRIS, R. *Proc. Indian Acad. Sci. A*, 16, *pp.* 287–289, *Oct.*, 1942.—Reports the study of a large and clear natural crystal of rhombic sulphur, with 2 different spectrographs. The instrument of higher resolving power showed that the Raman lines with small frequency shifts had a noticeable breadth.

1418 535.375.5 : 536.42

Raman effect and change of state: naphthalene. NORRIS, R. *Proc. Indian Acad. Sci. A*, 16, *pp.* 250–255, *Oct.*, 1942.—Reports a study of changes of the Raman spectra of naphthalene in the transition from solid to liquid state, when the spectra are recorded with the same instrument and on the same plate adjacent to each other, by using a Hartmann diaphragm. Almost all the Raman lines undergo rel. shifts of varying magnitudes and directions. Changes in intensities of the corresp. lines are observed. The paper also records more complete spectra of the naphthalene crystal and of the melt. Observations were made of the spectra of the naphthalene crystal

similarly recorded side by side for 2 different orientations. Relative shifts of lines are observed.

1419 535.375.5 : 541.57

Raman effect and hydrogen bonds. VI. Chelate compounds: esters of salicylic acid and their mixtures. VII. Study of a few typical carboxylic acids. MURTY, G. V. L. N., AND SESHADRI, T. R. *Proc. Indian Acad. Sci. A*, 16, *pp.* 244–249, *and pp.* 264–269, *Oct.*, 1942.—Raman spectra of methyl, ethyl, *n*-butyl, iso-amyl and phenyl esters of salicylic acid were studied. Besides the bright frequency attributable to the C=O group of the chelate structure, a weaker line corresp. to the unchelate molecule was observed in each case. The liquids contain the 2 types existing in equilibrium, the chelate molecules being predominant. The lowering of the C=O frequency by chelation indicates that this type of intramolecular H bond is strong. The spectra are unaffected; the chelate bond cannot be broken by anionoid and cationoid solvents. Raman spectra of propionic, formic, benzoic and cinnamic acid were studied, using the pure acids in the liquid or molten condition and solutions in various solvents, benzene (non-associating), water, ether dioxan, acetal, etc. (associating). The first closely resembles acetic acid, both of them indicating the existence of ring dimers, open dimers and monomers, the last two forms being present to a small extent in the free state and in increasing quantities in solution in associating liquids. There are 2 broad C=O lines in the pure liquid. The molten acids and benzene solutions of benzoic and cinnamic acids give only 1 C=O line corresp. to ring dimers, and in fairly dilute solutions in ethers, monomer-associates alone containing unco-ordinated C=O groups exist.

See Abstr. 1550 535.375.5 : 544.6

1420 535.375.5 = 3

Studies on the Raman effect. Contributions to the question on the structure of acetamide and its compounds. KAHOVEC, L., AND KNOLLMÜLLER, K. *Z. phys. Chem. B*, 51, *pp.* 49–59, *Dec.*, 1941.—The Raman spectra of mol. compounds of acetamide with various salts and with HCl, cationic and anionic compounds with Na and Hg, and formamide of Pb, were investigated and the results used for discussing the structure of these substances. R. N.

1421 535.375.5 = 3

Studies on the Raman effect. Chloro- and bromopicrin, trichloro-acetamide. WITTEK, H. *Z. phys. Chem. B*, 51, *pp.* 103–112, *Jan.*, 1942.—The Raman spectra of these substances and of trichloro-acetate were determined and the polarization was measured. The spectra are analysed and the frequencies are co-ordinated. R. N.

1422 535.375.5 = 3

The Raman spectrum of the liquid aluminium bromide. GERDING, H., AND SMIT, E. *Z. phys. Chem. B*, 51, *pp.* 217–218, *April*, 1942.—A comparison of the Raman lines determined by the authors and by Rosenbaum [*J. Chem. Phys.*, 8, *p.* 643, 1940] and a brief discussion of the structure of $AlCl_3$, $AlBr_3$ and AlI_3. R. N.

1423 535.375.5 : 541.63 = 3

The structure of the additive compound of aluminium chloride and sulphur dioxide. GERDING, H., AND SMIT, E. *Z. phys. Chem. B*, 51, *pp.* 200–216, *April*, 1942.—From Raman spectra taken at room temperature of the compounds $AlCl_3 . SO_2$ and $Al_2Cl_6 . 2SO_2$ and the component substances, and from polarization effects, the accurate measurement of which was only possible for the strongest Raman lines, conclusions are drawn on the most probable structure of the compounds. This is assumed to be $Al_2Cl_6 . 2SO_2$ with 4 Cl-atoms surrounding the Al-atoms in tetrahedra and non-regular tetrahedra of 2Cl- and 2O-atoms surrounding the S-atoms. R. N.

1424 535.417 : 681.4

The interferometer in lens and prism manufacture. TWYMAN, F. *Nature, Lond.*, 151, *pp.* 43–46, *Jan.* 9, 1943.—The general principles of the Michelson interferometer and of the Twyman and Green modification of this are given. Various workshop uses and problems are discussed—these include lens testing and prism testing. It is emphasized that the interferometer can be used for checking both accuracy of surfaces and homogeneity of material. A. H.

1425 535.428

Scattering of light in binary liquid mixtures. HARIHARAN, P. S. *Proc. Indian Acad. Sci. A*, 16, *pp.* 278–282, *Oct.*, 1942.—Raman's new technique [Abstr. 1541 (1942)] in the study of light scattering is applied to C_6H_6O–H_2O, CS_2–CH_4O and CH_4O–C_6H_{14}. Elliptic polarization was detected in the scattered light in the neighbourhood of the critical solution temperature. At higher temperatures, the ellipticity vanishes. Molecular clusters are formed in mixtures in the neighbourhood of the critical solution temperature, the clusters diminish in size with rising temperature.

1426 535.434 : 535.54

Elliptic polarization of light scattered in silver sols. HARIHARAN, P. S. *Proc. Indian Acad. Sci. A*, 16, *pp.* 283–286, *Oct.*, 1942.—A study was made of 5 unprotected silver sols, with sp. ref. to ellipticity in transversely scattered light. The nuclear sol exhibits neither ellipticity nor reversal of polarization. Sols III, V, IV and VI exhibit ellipticity in increasing order of magnitude.

See Abstr. 1540 535.434 : 537.36 : 541.182.046.7 = 3

1427 535.435

The scattering of light by liquid surfaces. HARIHARAN, P. S. *Proc. Indian Acad. Sci., A*, 16, *pp.* 290–293, *Oct.*, 1942.—The variations of the intensity of the scattering of light by a CH_4O surface with changes of the azimuth and of the angle of observation were measured by photographic photometry. The facts are not in accord with the theory as regards the influence of the angle of scattering.

1428 535.52 : 548

Optical crystallographic studies with the polarizing microscope. IV. Axial dispersion with change of sign. Other dispersion measurements. BRYANT, W. M. D. *J. Amer. Chem. Soc.*, 65, *pp.* 96–102, *Jan.*, 1943.—[See Abstr. 694 (1941)]. The dispersion of the optic axial angle in *trans*-stilbene was measured. This substance is optically pos. for wavelengths $> 4\,070$ Å and optically neg. for shorter wavelengths. Dispersion of the refr. indices α, β and γ in stilbene was determined. The refr. indices ε and ω of benzil were measured over a wide range of wavelengths. The

optical properties of thiourea were measured. This compound exhibits crossed axial plane dispersion near 3 780 Å in the ultra-violet.

1429 535.52 : 548

Optical crystallographic studies with the polarizing microscope. V. Ellipsoidal dispersion in the picrates of various amines. MITCHELL, J., JR., AND BRYANT, W. M. D. *J. Amer. Chem. Soc.*, 65, *pp.* 128–137, *Feb.*, 1943.—The optic axial angle $2H$ and dispersion of picric acid and of 32 picrates of amines were measured in monochromatic light from 6 908 Å in the red to the limit of transmission in the blue. The principal refr. indices and other optical properties of all of the low-temp. species were determined for 5 461 Å. The optic axial angles of *n*-propylamine, di-*n*-propylamine and guanidine picrates were measured photographically in the near infra-red, using ordinary microscope and camera equipment.

See Abstr. 1426 535.54 : 535.434

1430 535.55 : 539.3 = 6

Photo-elastic apparatus. ESCUDERO, A., AND ARNABOLDI, E. A. *Publ. Fac. Cienc. Fis.-Mat. La Plata*, 11, *pp.* 215–231, *Dec.*, 1942.—A detailed illustrated description of apparatus installed in the laboratory of the university of La Plata.

See Abstr. 1350 535.563 + 541.123.2 + 535.324 + 532.14

1431 535.563

Attempted asymmetric syntheses involving the Grignard reagent in optically active solvents. TARBELL, D. S., AND PAULSON, M. C. *J. Amer. Chem. Soc.*, 64, *pp.* 2842–2844, *Dec.*, 1942.—Methylphenylcarbinol prepared by the Grignard reaction in optically active methyl *s*-butyl ether is optically inactive. The carbinol prepared in dimethylbornylamine is also inactive, although a neutral optically active impurity is formed in the reaction.

1432 535.563 : 532.74 : 541.65 : 541.124

The inversion of menthone with trichloroacetic acid in aprotic solvents. WEISSBERGER, A. *J. Amer. Chem. Soc.*, 65, *pp.* 102–110, *Jan.*, 1943.—The inversion of *l*-menthone to *d*-isomenthone by trichloroacetic acid in benzene, hexane and chloroform was investigated at 20° with various conc. of acid and menthone. The catalytic activity per mole of acid has a max. when the molar ratio of acid to menthone is about 2. With a const. conc. of the acid, the reaction rate sinks with rising conc. of the menthone. If the menthone conc. is $<$ acid conc., the retarding effect of the menthone is more pronounced. The temp. coeff. of the reaction was determined at 20–50°. The inversion takes place by interaction of a binary acid-menthone complex with a further mol. of the monomeric acid. F.p. determinations were carried out on benzene solutions of menthone and trichloroacetic acid to determine the const. of the complex formation betw. menthone and acid, and the association const. of the acid.

1433 535.65

Specification and description of colour. *Bull. Amer. Soc. Test. Mater., No.* 119, *pp.* 19–20, *Dec.*, 1942.—A short note on an American War Std. (No. Z44 of the American Standards Association) for the Specification and Description of colour. E. R. A.

1434 535.653

Investigations on the intrinsic properties of the colour domain. II. SILBERSTEIN, L. *J. Opt. Soc. Amer.*, 33, *pp.* 1–10, *Jan.*, 1943.—A continuation of a previous examination [Abstr. 1969 (1938)], now making use of recent data on colour matching [Abstr. 2329 (1942)]. Since the curve repr. on the colour diagram the locus of all colours chromatically equidist. from a given colour is found always to approx. closely to a ellipse, the author shows how a true colour surface can be constructed, i.e. a surface on which points sep. by equal distances represent chromatically equidist. colours. J. W. T. W.

1435 535.653

Specification of small chromaticity differences. MACADAM, D. L. *J. Opt. Soc. Amer.*, 33, *pp.* 18–26, *Jan.*, 1943.—Gives diagrams by means of which it is possible to draw on the colour diagram the ellipse which represents the locus of equal chromaticity difference from any given colour. Such an ellipse may be used to find the black-body temperature which matches most nearly a colour which is close to, but not on, the black-body locus. It also gives a measure of the departure of the best match from a true match. The colour diagram covering a small area near a given colour may be projected so that the ellipse of equal chromaticity difference becomes a circle but no plane projection of the whole diagram will give uniform chromaticity representation. J. W. T. W.

1436 535.66 : 541.18 : 581.132

Problems in chromatography and in colloid chemistry illustrated by leaf pigments. STRAIN, H. H. *J. Phys. Chem.*, 46, *pp.* 1151–1161, *Dec.*, 1942.—Mixtures of green and yellow pigments extracted from autotrophic plants with organic solvents can be separated only by chromatographic analysis. The sensitivity and selectivity of this method depend upon different conditions, incl. the presence of colourless substances in the plant extracts. The selectivity may be increased by addition of polar substances. Clues to the mol. structure of adsorbed pigments may be obtained from their rel. positions on the adsorption columns. Yellow pigments appear to be intimately associated with the chlorophylls and protein in the leaf. The true state of the pigments in the living leaf is not known.

1437 535.668.1 = 3

Supermicroscopic investigation on the relation between covering power and crystal size of pigments. SCHMIEDER, F. *Kolloid Z.*, 95, *pp.* 29–33, *April*, 1941.—Although with coarse particles the covering power is increased when reducing the size of the particles, it is reduced with higher degrees of dispersion as diffraction predominates rel. to refraction and reflection if particle size $\ll$ wavelength. This was proved by electron-microscope pictures. Low brightness and low magnification must be used if low-melting pigments are investigated. R. N.

1438 535.7

Some problems in mathematical biophysics of visual perception and aesthetics. RASHEVSKY, N. *Bull. Math. Biophys.*, 4, *pp.* 177–191, *Dec.*, 1942.—The paper discusses perception of straight lines, perception of length, perception of intersections, dis-

connected contours; effects of associations; breaking up of a pattern into parts; some suggestions for exp. procedure.

See Abstr. 1539 535.822.4 : 678 : 541.182

1439 535.842 : 77

Method of recording macrostructures. COTTELL, G. A. *Engineering*, 155, *pp.* 81–83, *Jan.* 29, 1943.—A contact ink impression is made on to a transparent support and this is used as a negative for the production of a positive print on sensitized paper.

1440 535.843 : 778.3

Simplified photomicrography with a hand camera. LOVELAND, R. P. *Science*, 97, *pp.* 24–26, *Jan.* 1, 1943.—The advantages of and practical requirements in the use of a hand camera (of any sort) with a microscope are given. Generally a microscope of $> \times 25$ is preferable, and a simple achromatic camera lens is an advantage. The absence of the necessity for a dark-room is the chief advantage. E. H. W. B.

HEAT. THERMODYNAMICS

See Abstr. 1509 536 : 678 : 539.379

1441 536.21

Thermal insulation at medium temperatures. PALLOT, A. C. *J. Roy. Soc. Arts*, 91, *pp.* 122–135, *Feb.* 5, 1942.

1442 536.244 : 621.317.39

Analysing heat flow in cyclic furnace operation. BRADLEY, C. B., AND ERNST, C. E. *Mech. Engng, N.Y.*, 65, *pp.* 125–129, *Feb.*, 1943.—[Abstr. 1299 B (1943)].

1443 536.413

An apparatus for the measurement of thermal expansion at temperatures up to 100°C. MACEY, H. H. *J. Sci. Instrum.*, 20, *pp.* 48–49, *March*, 1943.—An apparatus for the measurement of expansion of fired clay materials is described, involving a compact but sensitive optical lever system.

See Abstr. 1418 536.42 : 535.375.5

1444 536.421.1 = 3

Thermo-analysis in the heatable microscope. IV. Contact method with binary systems with inhomogeneously melting compounds and mixture gaps in the liquid phases. KOFLER, A. *Z. phys. Chem. A*, 190, *pp.* 287–306, *April*, 1942.—For inhomogeneously melting compounds, e.g. those with a large difference in the m.p. of the component substances, the eutectic temperature and the transition point etc., may be readily determined during the heating process of a contact preparation observed in a microscope with heatable object carrier. As an example the system *p*-dinitrobenzene: α-naphthylamine was investigated.

R. N.

1445 536.421.4 : 539.219.2

Shattering and cracking of ice. WEST, P. W. *Industr. Engng Chem.*, 34, *pp.* 1515–1518, *Dec.*, 1942.—Carbonation of the waters being frozen will often eliminate cracking difficulties. Where treated waters were alkaline and cracking resulted, it was caused by removal of the free CO_2. Where cracking tendencies were reduced by treatment with H_2SO_4 or alum, the effect may be attributed to the resulting release of free CO_2 from the naturally occurring bicarbonates and carbonates in the water.

See Abstr. 1363 536.423.15 : 532.612.4

1446 536.423.15 : 532.77

Isopiestic measurements in dilute solutions: the system potassium-chloride–sodium-chloride at 25° at concentrations from 0·03 to 0·10 molal. GORDON, A. R. *J. Amer. Chem. Soc.*, 65, *pp.* 221–224, *Feb.*, 1943.—An isopiestic apparatus is described which will yield values of the isopiestic ratio for 1-1 electrolytes to conc. as low as 0·03 *m*. The slowness with which equilibrium is attained in such dilute solutions is due to the rate of transport of solvent in the vapour phase.

1447 536.423.15 : 532.77

The vapour pressure of aqueous solutions of sodium chloride at 20°, 25° and 30° for concentrations from 2 molal to saturation. OLYNYK, P., AND GORDON, A. R. *J. Amer. Chem. Soc.*, 65, *pp.* 224–226, *Feb.*, 1943.

1448 536.423.15 : 536.655

The vapour pressure of phenylhydrazine as a function of the temperature. WILLIAMS, G. E., AND GILBERT, E. C. *J. Amer. Chem. Soc.*, 64, *pp.* 2776–2777, *Dec.*, 1942.—The v.p. was measured by the isoteniscope at 105°–192° with a precision of ± 0·4 mm. An empirical equation was derived by the method of least squares which reproduced these values to within the exp. precision. The lat. ht. of vaporization from 25°–240° is tabulated.

1449 536.423.15 : 632.94

The vapour pressure of phenothiazine. NELSON, O. A., AND SMITH, L. E. *J. Amer. Chem. Soc.*, 64, *pp.* 3035–3037, *Dec.*, 1942.—The v.p. of phenothiazine within the range of 63°–121° and the rate of evaporation of the finely powdered compound at 45° have been determined. The loss in toxicity of phenothiazine when used for the control of insect pests is not due to evaporation.

1450 536.46

Stability and structure of burner flames. LEWIS, B., AND ELBE, G. VON. *J. Chem. Phys.*, 11, *pp.* 75–97, *Feb.*, 1943.—The condition of equality of gas and burning velocities for flame stabilization, and its maintenance betw. two critical gradients of the gas vel. from flash-back to blow-off, are examined. The gas-flow pattern was studied by photographing stroboscopically illuminated MgO dust particles. The temperature distribution in the flame was determined by the Na-line-reversal method. Photographs, data and curves for natural-gas–air and natural-gas–O_2 flames are given and discussed. N. M. B.

See Abstr. 1351 536.49 : [532.14 + 535.324

1451 536.5

Temperature determinations in theory and in practice. TAWDE, N. R., AND UNVALA, H. A. *J. Univ. Bombay*, 11, *pp.* 166–171, *Nov.*, 1942.—A descriptive account. Methods are classed as (1) Contact: including thermal expansion, thermo-e.m.f., change in elect. res., change in mag. susceptibility, change of state, calorimeter pyrometry. (2) Non-contact: Black-body radiation, total-intensity radiometers, optical and p.e. pyrometers, grey-body temp., electronically excited radiation, probe method. Bibliography. E. H. W. B.

1452 536.53 : 621.43.016.4 = 3

Measurement of the variation of gas temperature in internal-combustion engines. GRAFF, H. *VDI* [*Z. Ver. dtsch. Ing.*], 86, *pp.* 461–466, *July* 25, 1942.—A comparative survey of the different methods for determining the gas temperature inside the cylinder of i.c. engines with sp. reg. to the photocell method [Abstr. 772 B (1942)] which works with an accuracy of ± 1·5%. Bibliography. R. N.

See Abstr. 1299 536.63 : 532.13 : 518.3

1453 536.631 : 536.77

The specific heats at low temperatures of anhydrous sulphates of iron, magnesium, manganese and potassium. MOORE, G. E., AND KELLEY, K. K. *J. Amer. Chem. Soc.*, 64, *pp.* 2949–2951, *Dec.*, 1942.—Sp. ht. measurements are reported in the range 51° to 298°K. Values of free energy of formation based upon the third law of thermodynamics are computed and compared with results from other data.

1454 536.632

The heat capacities at higher temperatures of ethane and propane. DAILEY, B. P., WITH FELSING, W. A. *J. Amer. Chem. Soc.*, 65, *pp.* 42–44, *Jan.*, 1943.

1455 536.632 : 541.636

Heat capacities of and hindered rotation in *n*-butane and isobutane. DAILEY, B. P., WITH FELSING, W. A. *J. Amer. Chem. Soc.*, 65, *pp.* 44–46, *Jan.*, 1943.

1456 536.633.3

The resonance method of measuring the ratio of the specific heats of a gas, C_p/C_v. IV. CLARK, A. L., AND KATZ, L. *Canad. J. Res. A*, 21, *pp.* 1–17, *Jan.*, 1943.—A continuation of work already published [Abstr. 1079 (1942)]. A new theoretical treatment of the effect of the non-adiabatic behaviour of a gas subjected to alternate compressions and rarefactions is developed for both spherical and cylindrical chambers. This theory is applied to previous results as well as to some new ones. The results are as accurate as may be obtained by direct exp. methods, under the most favourable conditions.

1457 536.653 : 536.753 : 532.739.2

Solubility studies. VII. The solubilities of some isomeric ketones in water. SAYLOR, J. H., BAXT, V. J., AND GROSS, P. M. *J. Amer. Chem. Soc.*, 64, *pp.* 2742–2744, *Dec.*, 1942.—The solubilities in water of dipropyl, diisopropyl and methyl *n*-amyl ketones were determined at 10°–75° and vapour solubilities computed. Free energies, heats and entropies of solution are calculated.

1458 536.655

The heats of vaporization of some hexanes. LEMONS, J. F., WITH FELSING, W. A. *J. Amer. Chem. Soc.*, 65, *pp.* 46–48, *Jan.*, 1943.

See Abstr. 1448 536.655 : 536.423.15

1459 536.662

Heats of combustion. II. The heats of combustion of ethyl methyl ketone and ethylene oxide. CROG, R. S., AND HUNT, H. *J. Phys. Chem.*, 46, *pp.* 1162–1163, *Dec.*, 1942.—[See Abstr. 778 (1942)].

See Abstr. 1534 536.7 : 532.77 : 541.134

See Abstr. 1533 536.7 : 541.132

See Abstr. 1536 536.7 : 541.135.5

1460 536.7 : 548

The thermodynamics of crystal lattices. I. Discussion of the methods of calculation. BORN, M. **II. Calculation of certain lattice sums occurring in thermodynamics.** BORN, M., AND BRADBURN, M. **III. The equation of state for a face-centred cubic lattice.** BRADBURN, M. *Proc. Camb. Phil. Soc.*, 39, *pp.* 100–127, *April*, 1943.—Theoretical. An introduction to a series of papers designed to work out the dependence on temperature of the elastic constants up to the m.p. following up previous papers in which difficulties connected with lattice stability have been overcome.—Describes a method of calculating a general type of lattice sum, involving the phases of the waves, which occurs in the investigation of the thermodynamic properties of crystals. Tables of the lowest lattice sums are computed.—The equation of state of the simplest stable crystal, the cubic face-centred, is accurately determined and compared with the result obtained by rough approximations. The use of the latter involves an error which is no larger than that arising from the uncertainty of the atomic force law. J. T.

1461 536.7 : 678

Equation of state of some synthetic rubbers. PETERSON, L. E., ANTHONY, R. L., AND GUTH, E. *Industr. Engng Chem.*, 34, *pp.* 1349–1352, *Nov.*, 1942.—Three synthetic rubbers—two samples of neoprene, and one of hyocar—were investigated. They show plastic flow and permanent set to a greater degree than rubber. The three samples have the same type of stress/temperature, and stress/rel.-length curves. The equation of state that holds for rubber also gives the retractive force of these samples when stretched. A. J. M.

See Abstr. 1377 536.7 : 678 : 532.77

1462 536.712

The second virial coefficients of gaseous mixtures. EDWARDS, A. E., AND ROSEVEARE, W. E. *J. Amer. Chem. Soc.*, 64, *pp.* 2816–2819, *Dec.*, 1942.—The theory and practice of a method for determining the second virial coeff. of gaseous mixtures is described. The method gives data for mixtures corresp. in accuracy to those obtained by gas density measurements to approx. 0·002%. Values for 9 pairs of gases at 25° are reported.

See Abstr. 1457 536.753 : 532.739.2 : 536.653

See Abstr. 1453 536.77 : 536.631

ELECTRICITY. MAGNETISM

See Abstr. 1487, 1488 537.12 : 539.13

1463 537.122 : 538.691 = 3

Movement of the meson in a homogeneous magnetic field. GALANIN, A. D. *J. Phys., U.S.S.R.*, 6, 1–2, *pp.* 27–34, 1942.—The equations of motion of a meson in a homogeneous magnetic field are given. The expression for the energy of the meson indicates that the particle has a magnetic moment independent of velocity. A. J. M.

1464 537.221 : 541.134

Contact potentials. CHALMERS, J. A., AND HUME-ROTHERY, W. *Phil. Mag.*, 34, *p.* 213, *March*, 1943.—[See Abstr. 175 (1943)].

1465 537.226.2 : 539.133

Dipole moment, induction and resonance in nitroethane and some chloronitroparaffins. HURDIS, E. C.,

AND SMYTH, C. P. *J. Amer. Chem. Soc.*, 64, *pp.* 2829–2834, *Dec.*, 1942.—The dielectric const. of the vapours of nitroethane, chloronitromethane, 1-chloro-1-nitroethane and 1-chloro-1-nitropropane were measured and used to calculate the dipole moments of the molecules. As a check, measurements were made upon CO_2, benzene, *n*-octane and water vapour. The increases from chloronitromethane to ethane and from ethane to propane are attributed to increased stabilization of resonating polar forms by the distribution of the neg. charge over 2 groups in the di-substituted compounds instead of its localization on 1 group as in the monosubstituted compounds.

1466 537.226.2 : 539.133 : 541.67

The structural effects of unsaturation and hyperconjugation in aldehydes, nitriles and chlorides as shown by their dipole moments in the vapour state. HURDIS, E. C., AND SMYTH, C. P. *J. Amer. Chem. Soc.*, 65, *pp.* 89–96, *Jan.*, 1943.—The dielectric const. of the vapours of formaldehyde, acetaldehyde, propionaldehyde, butyraldehyde, crotonaldehyde, diketene, propionitrile, acrylonitrile, crotononitrile and isocrotyl chloride were measured and used to calculate the dipole moments of the molecules. The moment of the C–O bond in the carbonyl group is recalculated and its inductive effect in aldehydes and ketones is examined. Close analogies in behaviour and in structure are found among unsaturated aldehydes, nitriles and chlorides. Resonance among structures made possible by the presence of a double bond may have a large effect upon the moment of a molecule. Hyperconjugation occurring when a H adjacent to a double bond is replaced by a methyl group produces a large increase in moment.

See Abstr. 1543 537.241 : 541.182.63 = 3

See Abstr. 1518 537.311 : 621.315.221 : 539.501

1467 537.311.1

On the theory of the electric resistance of metals. WEISSKOPF, V. F. *Amer. J. Phys.*, 11, *pp.* 1–12, *Feb.*, 1943.—This paper presents the fundamentals of the modern theory, which is based on the concept of electron waves passing through the ionic fields of the crystal lattice. The theory leads to an expression for the conductivity in terms of quantities which are known, with the exception of the cross-section of an ion for the scattering of an electron, which is, however, of the order of the square of the lattice distance. A table gives characteristic values for various monovalent and divalent metals and some transition metals. No satisfactory explanation has yet been given for the phenomena of supraconductivity.

A. E. T.

1468 537.312 : 679.56 : 621.315.616.96 = 3

On synthetic substances II/1. Electric conductivity during the reaction of acid or alkaline mixtures of phenol and formaldehyde. MANEGOLD, E., AND PETZOLD, W. *Kolloid Z.*, 95, *pp.* 59–69, *April*, 1941.—[Abstr. 1254 B (1943)].

1469 537.312.62

On the transition of a hollow sphere from a supraconducting to a non-supraconducting state. SHALNIKOFF, A. I. *J. Phys., U.S.S.R.*, 6, 1–2, *pp.* 53–60, 1942.—The transition of hollow spheres with different wall thicknesses from the supraconducting to the normal state and back again under the influence of an external field was investigated. The character of the changes in the size of the hysteresis plateau was established with their dependence on the relation betw. the thickness of the sphere and the outside radius.

1470 537.312.62

On the magnetic moment of supraconductors. NAKHUTIN, I. E. *J. Phys., U.S.S.R.*, 6, 3–4, *pp.* 114–115, 1942.—The magnetic moment of a Sn single crystal has been measured in various crystallographic directions. Within the limits of accuracy of the measurements the critical fields are independent of the orientation of the crystal in the magnetic field.

See Abstr. 1326 537.313 : 53.08

See Abstr. 1540 537.36 : 535.434 : 541.182.046.7 = 3

1471 537.363

The theory and application of a two-path rectangular micro-electrophoresis cell. BENIAMS, H., AND GUSTAVSON, R. G. *J. Phys. Chem.*, 46, *pp.* 1015–1023, *Dec.*, 1942.—The theory of the rectangular 2-path cell is developed and an estimate made of the permissible error in the ratio of depths for an actual cell. A method of constructing such cells is discussed. The comparison with a 1-path rectangular cell shows that the cell is capable of yielding quantitative results.

1472 537.363 : 541.18.043 : 616.2

A general electrophoretic pattern in extracts of pollens causing hay fever. ABRAMSON, H. A., MOORE, D. H., AND GETTNER, H. H. *J. Phys. Chem.*, 46, *pp.* 1129–1139, *Dec.*, 1942.—Earlier studies [Abstr. 1570 (1942)] are extended to include timothy grass, Bermuda grass, June grass, sheep sorrel and orchard grass, as well as birch and oak pollens. Ultracentrifugal and diffusion studies of timothy pollen extract indicate that the mol. wt. of the major biologically active components are low, close to 5 000, similar to those of ragweed extract. In the case of June grass, Bermuda grass, timothy grass and sheep sorrel, the colourless fractions were biologically active. Other chemical and immunological data are presented.

1473 537.523.3 : 621.3.015.532

Positive and negative point-to-plane corona in pure and impure hydrogen, nitrogen and argon. WEISSLER, G. L. *Phys. Rev.*, 63, *pp.* 96–107, *Feb.* 1 *and* 15, 1943.—[Abstr. 1198 B (1943)].

1474 537.531 : 535.3

Absolute X-ray wavelengths. LIPSON, H., AND RILEY, D. P., SIEGBAHN, M. *Nature, Lond.*, 151, *pp.* 250–251, *Feb.* 27, *and p.* 502, *May* 1, 1943.

1475 537.531.9

Mode of action of ionizing radiations on aqueous solutions. DALE, W. M., MEREDITH, W. J., AND TWEEDIE, M. C. K. *Nature, Lond.*, 151, *pp.* 280–281, *March* 6, 1943.

1476 537.531.9 : 539.185.9 : 576.312.3

Effects of X-rays and neutrons on mouse lymphoma chromosomes in different stages of the nuclear cycle. MARSHAK, A. *Radiology*, 39, *pp.* 621–626, *Nov.*, 1942.—Curves are obtained of the chromosomes remaining after treatment by X-rays and neutrons, separately. These curves are used to measure a ratio n/x showing the rel. eff. of the radiations. Neutrons are more effective than X-rays. B. J. L.

See Abstr. 1544 537.533.73 : 541.182.63

1477 537.533.92 : 535.336.2

Ionization and dissociation by electron impact: butene-1. STEVENSON, D. P. *J. Amer. Chem. Soc.*, 65, *pp.* 209–212, *Feb.*, 1942.—[See Abstr. 2882 (1942)]. The appearance potentials and rel. abundances of ions in the mass spectrum of butene-1 are reported. The spectrum is compared with those of isobutylene and the butanes. A summary of the heats of dissociation deduced from electron-impact data is included.

See Abstr. 1403 537.533.92 : 535.336.2

1478 537.564 = 3

Passage of slow potassium ions through gases at low pressure. POEVERLEIN, H. *Ann. Phys., Lpz.*, 42, 1, *pp.* 1–34, 1942.—The K ions are produced by surface ionization. The apparatus previously described [Abstr. 4924 (1936)] is improved. The decrease in intensity of the ion rays (12–200 velocity) in A is determined. The effective cross-sections evaluated agree with existing data. The velocity distribution of ions which have passed through gas (He, A, Kr or N_2) without alteration of direction, or with only slight alteration, is investigated. With the conditions chosen (350 V initial vel., small angle of scatter and low gas pressure) loss in vel. is experienced by very few ions. Velocity losses by inelastic collision were not detected. H. G. S.

1479 537.74 : 621.317.715 = 3

On the adjustment of a double galvanometer. PASSOTH, G. *Ann. Phys., Lpz.*, 42, 1, *pp.* 35–48, 1942.—[Abstr. 1313 B (1943)].

1480 537.74 : 621.317.715 = 3

On the limit of measurement with a double galvanometer. PASSOTH, G. *Ann. Phys., Lpz.*, 42, 1, *pp.* 49–62, 1942.—[Abstr. 1314 B (1943)].

1481 538.111 : 621.3.013 = 3

On the theory of the magnetic field. KNEISSLER-MAIXDORF, L. *Arch. Elektrotechn.*, 36, *pp.* 471–483, *Aug.*, 1942.—[Abstr. 1195 B (1943)].

1482 538.22 : 539.133 = 3

Intermolecular forces and diamagnetism of organic molecules. RAUTENFELD, F. VON, AND STEURER, E. *Z. phys. Chem. B*, 51, *pp.* 39–48, *Dec.*, 1941.—The susceptibilities of mixtures of alcohols, ketones, ethers and acids with polar and non-polar liquids, e.g. hexane, dioxane, benzene, chloroform and water, were measured and compared with values calculated from the mixture rule. The differences are larger with substances with large intermolecular forces, e.g. alcohols, acids, ketones, and small or zero with ethers and higher hydrocarbons. From changes in susceptibility with association, conclusions may be drawn on the state of distribution of the electrons determining the bondages in these associations. R. N.

1483 538.3 : 530.12

Rational electrodynamics. I. The limitations of classical electromagnetism. II. The ideas of kinematical relativity. MILNE, E. A. *Phil. Mag.*, 34, *pp.* 73–101, *Feb.*, 1943.—The limitations of classical electromagnetic theory are considered in connection with the following points: The localization of energy in the field in the presence of point charges is illegitimate. This leads to failure of Wiechert's formula and Poynting's theorem. Magnetic intensity is not properly introduced. It should be introduced as a constituent of the mech. force on a small moving charge. It cannot be expected to hold for charges moving with speeds approaching that of light. In addition, the theory fails to specify any detailed frame of reference.—A theory of kinematical relativity is developed which offers a more satisfactory theory of electromagnetism. The equation of motion of a free particle is obtained, and a system of dynamics is based on it. A. J. M.

See Abstr. 1330 538.3 : 530.15

1484 538.565.5 : 621.396.611.33

Some aspects of coupled and resonant circuits. SHERMAN, J. B. *Proc. Inst. Radio Engrs, N.Y.*, 30, *pp.* 505–510, *Nov.*, 1942.—[Abstr. 1420 B (1943)].

1485 538.566.2 : 621.396.11

Refractive indices of gases at high radio frequencies. KERR, F. J. *Proc. Phys. Soc., Lond.*, 55, *pp.* 92–98, *March*, 1943.—A concentric line fitted with a piston and micrometer screw is used to measure the wavelength of a given oscillator, firstly with the line evacuated and then filled with gas. Resonance is observed by means of a diode voltmeter and the change can be detected to about 20%. From the mean of results the refr. index is calculated; the effect of temperature variation is also studied. F. T. F.

1486 538.652 : 621.317.4 = 3

An equipment for the quick photographic recording of magnetostriction curves. KORNETZKI. *Wiss. Veröff. Siemens-Werk.*, 20, 2, *pp.* 48–53, 1942. *Abstr. in Wireless Engr*, 20, *p.* 47, *Jan.*, 1943.—[Abstr. 1303 B (1943)].

See Abstr. 1463 538.691 : 537.122 = 3

MOLECULAR AND ATOMIC PHYSICS

1487 539.13 : 537.12

The dipole character of the meson and the polarization of vacuum. IWANENKO, D., AND SOKOLOW, A. *J. Phys., U.S.S.R.*, 6, 3–4, *pp.* 175–179, 1942.—Proca equations lead in a general way to the apparition of an effective dipole of a meson. The part played by the latter is illustrated on some nuclear and electromagnetic processes and by some non-linear problems.

1488 539.13 : 537.12

On the pseudoscalar theory of meson. GINSBURG, V. L. *J. Phys., U.S.S.R.*, 6, 3–4, *pp.* 180–184, 1942.—Probabilities of various processes caused by interaction of mesons with heavy particles and photons are calculated. The meson is described by a pseudoscalar wave function. Certain problems of the meson theory (the spin of the meson, the excited states of heavy particles) are discussed.

1489 539.132 = 3

Properties of electron and meson spin in the classical approximation. GALANIN, A. D. *J. Phys., U.S.S.R.*, 6, 1–2, *pp.* 35–47, 1942.—Equations are developed by which the precession of the electron and meson spins for the motion of the particle in the classical orbit can be determined. At small velocities both the electron and the meson behave as classical particles with a mech. and a magnetic moment. The m.m.

of the meson does not vary with velocity, but the precession of the meson spin differs from the classical. A. J. M.

1490 539.132 = 3

Quantum-theoretical calculations on the problem of the quinoidal state. SEEL, F. *Z. phys. Chem. B*, 51, *pp.* 229–243, *April*, 1942.—The electron configuration of the quinoidal system is investigated according to quantum-theoretical expressions and methods. The results of this analysis not only make feasible an unbiassed decision on the possibility of existence of benzoquinones but procure a deeper insight into the nature and origin of the chem. properties of these compounds. R. N.

1491 539.132 : 541.5 = 3

On the question of the structure of the carboxylsulphide molecule. A remark on the investigation of J. Wagner. EUCKEN, A., AND SCHÄFER, K. *Z. phys. Chem. B*, 51, *pp.* 60–61, *Dec.*, 1941.—The evidence produced [Abstr. 2638 (1941)] is considered insufficient for proving the non-linearity of the COS molecule. Considerations based on previous investigations [Abstr. 843 (1941)] and concerning the mol. heat in ranges where the normal oscillations are not yet excited lead to the conclusion that the COS molecule is linear in accordance with the usual quantum-mechanical conceptions of valency. R. N.

1492 539.133

The molecular structure of methyl isocyanide. GORDY, W., AND PAULING, L. *J. Amer. Chem. Soc.*, 64, *pp.* 2952–2953, *Dec.*, 1942.—The electron diffraction study of methyl isocyanide shows the molecule to be linear, with interatomic distances $H_3C–N = 1·44 \pm 0·02$ Å and $N–C = 1·18 \pm 0·02$ Å.

1493 539.133

The dipole moment of *ms*-tetraphenylporphine. KUMLER, W. D. *J. Amer. Chem. Soc.*, 64, *pp.* 2993–2994, *Dec.*, 1942.—The more abundant isometer of *ms*-tetraphenylporphine was found to have a polarization of 310 and an electronic polarization of 297. Measurement of polarizations at different temperatures gave no evidence of a decrease of polarizations with increasing temperatures. The electronic polarization of the compound was obtained by measuring the refr. index of the solutions. The structure is discussed.

1494 539.133

Dipole moments and molecular structure. III. Dipole moments of diethyl esters of substituted malonic acids. PHALNIKAR, N. L. **IV. Dipole moments of glyptals.** SATHE, N. V., PHALNIKAR, N. L., AND BHIDE, B. V. *J. Univ. Bombay*, 11, *pp.* 87–95, *Nov.*, 1942.—[See Abstr. 1852 (1942)]. The moments of diethyl esters of substituted malonic acids and cyclic 1 : 1 dicarboxylic acids are calculated and compared with the obs. moments. The results are in accordance with the valency deflection hypothesis.

1495 539.133

The molecular structure of ozone. SHAND, W., JR., AND SPURR, R. A. *J. Amer. Chem. Soc.*, 65, *pp.* 179–181, *Feb.*, 1943.—The electron diffraction investigation of ozone shows that the molecule is of the form of an isosceles triangle with O–O bond distance $1·26 \pm 0·02$ Å and O–O–O angle $(127 \pm 3)°$.

1496 539.133 : 532.74

Solvent polarization error and its elimination in calculating dipole moments. HALVERSTADT, I. F., AND KUMLER, W. D. *J. Amer. Chem. Soc.*, 64, *pp.* 2988–2992, *Dec.*, 1942.—Available data indicate that the dielectric-const./wt.-fraction curves for polar solutes in non-polar solvents are straight lines in dilute solutions: hence the polarization cannot be a linear function of the conc., and dipole moments calculated by linear extrapolation are in error. A new method is devised for calculating polarizations at inf. dilution which eliminates solvent-polarization error, is indep. of the judgment of the calculator, and in which all extrapolations are made either statistically or graphically with straight-line functions. Evidence shows that solvent-polarization errors are responsible for some erroneous dipole-moment values in the literature. The method is applied to some anomalous cases and values are obtained more consistent with theory and with other determinations. Illustrative data for nitrobenzene in benzene and for sulphanilamide are given. N. M. B.

See Abstr. 1465 539.133 : 537.226.2

See Abstr. 1482 539.133 : 538.22 = 3

See Abstr. 1466 539.133 : 541.67 : 537.226.2

1497 539.16.08

Analysis for potassium by its natural radioactivity. BARNES, R. B., AND SALLEY, D. J. *Industr. Engng Chem. (Analyt. Edit.)*, 15, *pp.* 4–7, *Jan.* 15, 1943.—The apparatus consisted of a small counter in a Pb shield, an amplifying and recording circuit, and a glass cell for the solutions. The procedure was to prepare solutions of known conc. of K salts, alone and mixed with other salts, and to make a 2 hr. count on each. Background counts were taken for the same length of time with distilled water in the cell.

See Abstr. 1476 539.185.9 : 576.312.3 : 537.531.9

1498 539.185.9 : 615.84

The treatment of cancer with fast neutrons. STONE, R. S., AND LARKIN, J. C. *Radiology*, 39, *pp.* 608–620, *Nov.*, 1942.—The cyclotron producing deuterons at 16 eMV energy has been utilized to treat cancerous growths. 50% of incurable cases were still alive when this report was written, some showed total and others partial retrogression. B. J. L.

1499 539.21

High polymer fibres: internal structure and physical properties. FREUND, E. H., AND MARK, H. *Rayon Text. Mon.*, 23, *pp.* 515–517 *and* 605–606, 1942. *Abstr. in J. Text. Inst. Manchr*, 34, *p. A95*, *Feb.*, 1943.—The completely organized or crystallized state and the completely disordered or amorphous state are discussed and the occurrence of a continuous variation in degree of randomness betw. these extremes is pointed out. Stretching, rolling and annealing favour crystallinity whilst shrinking, swelling, quenching, etc., bring the system into a more amorphous state. The crystallized areas give high mod. of elasticity, rigidity and ultimate tensile strength, whilst the disordered parts are responsible for flexibility, recovery, elongation and swelling.

See Abstr. 1335 539.215 : 531.717.1

1500 539.215 : 542.67 = 3

Theoretical foundations of filtration with special ference to the filtration of aerosols. WITZMANN, H. *olloid Z.*, 95, *pp.* 102–119, *April*, 1941.—A compre- nsive critical survey of the various theories of tration and an investigation into the elementary rocesses under test conditions. While with liquid stems secondary phenomena, e.g. swelling and ocking, complicate the problem, the theoretical vestigation of the filtration of aerosols is more omising. The influence of particle size and erage pore width of the filtering material, the ementary phenomena in the filtration of dust and noke, the preparation and characteristic properties a test smoke, tests with multiple filters, the separa- on through thermal movement and the mech. paration through sedimentation, centrifugation and mpact, and the rel. deg. of dust extraction, are scussed. R. N.

1501 539.216 : 541.68 : 677.31 = 3

On the fine structure of wool keratin. NOWOTNY, ., AND ZAHN, H. *Z. phys. Chem. B*, 51, *pp.* 265–280, ne, 1942.—[See Abstr. 2146 (1942)]. The reasons r assuming that the laminar structure and the grate rmation betw. main chains and backbone are sponsible for the high stability of the keratin fibre e further discussed. Comparative X-ray diagrams e given and comparisons are made with similar bstances having a laminar structure. R. N.

See Abstr. 1508 539.216 : 677.31 : 539.264 = 3

1502 539.216.1

Structure of keratin fibres. STOVES, J. L. *Nature, ond.*, 151, *pp.* 304–305, *March* 13, 1943.

1503 539.216.1 : 531.71 : 677.31

The distribution of cut fibre lengths in wool sampled y cylindrical tube borings. MICHELSON, I., TANNER, ., AND WOLLNER, H. J. *Industr. Engng Chem. Analyt. Edit.*), 14, *pp.* 949–951, *Dec.* 15, 1942.—The mpling method consists of drawing a cylindrical ore of wool from a bale by a rotating sharp-edged rcular tube. The fibres which are cut are those ing in the path of the cutting edge. Part of the cut bres is in the core of wool in the sampling tube, the alance is left in the bale. Formulae for determining e quantities of cut fibres both inside and outside e tube, and tables of weights and percentages lculated from the formulae, are given. Attempts e made to determine the average distribution of cut bre lengths when the fibre-cutting incident to samp- ng is at a max. The percentages of short fibres roduced by the sampling operation in the cores, rimarily because they are based on the vol. of the ore instead of the bale, are considerably greater, nd are of the same order of magnitude as the per- ntage of short fibres originally present. e.g. 0·30% f the fibres are cut shorter than 0·125 in. This in- rmation may be of value in the design of equipment r the processing of such wool. H. H. HO.

See Abstr. 1445 539.219.2 : 536.421.4

See Abstr. 1334 539.231 : 531.717

1504 539.26

X-ray evidence of the nature of cold-work in metals. TOKES, A. R., PASCOE, K. J., AND LIPSON, H. *Nature, Lond.*, 151, p. 137, *Jan.* 30, 1943.

1505 539.26 : 541.124 : 678

X-ray study of reactions involving accelerators. CLARK, G. L., LETOURNEAU, R. L., AND BALL, J. M. *Industr. Engng Chem.*, 35, *pp.* 198–204, *Feb.*, 1943.—Chemical reactions between accelerator and accelerator activator are shown by the X-ray method to take place in rubber stocks at the curing temperature. These accelerator salts are highly oriented in the rubber matrix on stretching. This signifies a strong bond betw. the rubber crystallites and the grains of accelerator salt. Reinforcing pigments, such as small-particle-size whiting and zinc oxide, orient themselves in the rubber matrix on stretching.

1506 539.26 : 621.386.84

A rapid X-ray diffraction method. MCCORD, A. T. *Industr. Engng Chem.* (*Analyt. Edit.*), 14, *pp.* 793–796, *Oct.*, 1942.—[Abstr. 1410 B (1943)].

1507 539.26 : 666

Investigation of ceramic materials by optical and X-ray analysis. ROSENTHAL, E. *Electronic Engng*, 15, *pp.* 320–323, *Jan.*, 1943.—A brief account of the principles of X-ray analysis, together with a description of the way in which it has been used to determine the effect of various processes on the structure and constitution of ceramic materials and the relationship of the results obtained to those found by microscopic examination. J. T.

1508 539.264 : 539.216 : 677.31 = 3

On the structure of wool and its reactivity. ELÖD, E., NOVOTNY, H., AND ZAHN, H. *Kolloid Z.*, 95, *pp.* 81–82, *April*, 1941.—[See Abstr. 2146 (1942)]. A brief report on X-ray investigations on spines of porcupine made for explaining the laminar fine structure of the marginal layer of wool fibre. R. N.

ELASTICITY. STRENGTH

See Abstr. 1430 539.3 : 535.55 = 6

1509 539.379 : 536 : 678

Rise of temperature on fast stretching of synthetics and natural rubbers. DART, S. L., ANTHONY, R. L., AND GUTH, E. *Industr. Engng Chem.*, 34, *pp.* 1340–1342, *Nov.*, 1942.—The specimen was stretched by a falling weight, and a ratchet kept it stretched; the temperature after stretching and after retraction was obtained from a thermocouple. The total change for latex stock for a stretch of about 600% was of the order of 10°C. In unaccelerated stock the temperature changes were small, and in loaded stock there is a large heating but small cooling. For the accelerated stocks the curves took an upward trend near 300% stretch: this is assumed to be due to the beginning of crystallization, and a large proportion of the heat observed above this is lat. ht. of fusion. Also the temperature response lags behind the stretch for high elongations. G. E. A.

1510 539.388.8 : 678

Volume change of hycar OR-15 compounds on immersion. JUVE, A. E., AND GARVEY, B. S., JR. *Industr. Engng Chem.*, 34, *pp.* 1316–1319, *Nov.*, 1942.—The change in vol. of compounds of hycar OR–15 depends on the temperature of immersion, the softener in the compound, and the type of test specimen.

1511 539.388.8 : 678

Effect of aniline point of oil on swelling of synthetic rubbers. HANSON, A. C. *Indust. Engng Chem.*, 34, *pp.* 1326–1327, *Nov.*, 1942.

See Abstr. 1359 539.4 + 532.13 + 532.61] : 576.3

1512 539.4/.5 : 678.7

Effect of carbon blacks in synthetic tire compounds. GARVEY, B. S., JR., AND FREESE, J. A., JR. *Industr. Engng Chem.*, 34, *pp.* 1277–1283, *Nov.*, 1942.—Ten types of carbon black, repr. by 24 commercial and experimental products, are compared in the std. American butadiene-styrene rubber. Each black is evaluated in 6 loadings from 20 to 75 parts per 100 parts rubber. Each compound is evaluated for processing characteristics, stress/strain, set, flexing, hot tear, heat brittleness, hysteresis, rebound and hardness.

1513 539.4 : 669.71

Working stresses in aluminium-alloy structures. THOMAS, E. W. *Engineering*, 155, *p.* 101, *Feb.* 5, 1943.

See Abstr. 1529 539.4.015 : 678.02 : 541.124

1514 539.4.015.1 : 669.6

The effect of grain size on the tensile strength of tin and tin alloys. PELL-WALPOLE, W. T. *J. Inst. Met.*, 69, *pp.* 131–146, *March*, 1943.—The tensile strength of Sn and certain of its alloys is influenced by grain size. The controlling factor is the number of grains in the cross-sectional area. In rolled material, an increase in tensile strength is found as the grain size decreases from 1 to 20–30 grains in the cross-section. Elongations are const. Further reduction in grain size produces a slight increase in tensile strength, but elongations increase rapidly. With cast materials consisting entirely of columnar grains, tensile strengths increase continuously with reduction of grain size over the whole region investigated. Elongations are either const. or increase slightly. The true stress for rolled material increases continuously over the whole range of grain size.

1515 539.4.016.3 : 669.14-41

Repeated stress-relieving treatments of steel plate. EBERLE, F., AND BRICK, T. *Metals and Alloys*, *pp.* 894–901, *Nov.*, 1942.—Results of investigations on the effects of stress-relieving treatments on 5 types of steel plate are given. Up to 10 treatments may be applied without appreciably lowering the room-temperature mech. properties of the steels but creep properties are affected. Progressive spheroidization of carbides is produced so that after 4–5 treatments carbide coalescence causes a lowering of resistance to creep. The specified and actual analyses and tensile properties of the steels are tabulated. M.-V.

1516 539.431 : 669.14 = 3

Sustained strength and elongation properties of steels under heat. HEMPEL, M., AND KRUG, H. *VDI* [*Z. Ver. dtsch. Ing*], 86, *pp.* 599–605, *Oct.* 3, 1942.—Wöhler's method of fatigue test is insufficient for determining the sustained strength of steels above 300°C. By taking into consideration the elongation, diagrams of sustained strength are obtained in which the ranges of permissible and inadmissible elongations are sharply divided. The special properties influencing these diagrams, and the precautions necessary when drawing conclusions from them on materials not yet tested, are discussed. R. N.

See Abstr. 1384 539.433 : 678 : 534.143

1517 539.501

Classification of rheological properties. BARTLETT, R. *Nature, Lond.*, 151, *p.* 198, *Feb.* 13, 1943.

1518 539.501 : 537.311 : 621.315.221

Frictional phenomena. XII. Technical applications of the plastic flow of solids. GEMANT, A. *J. Appl Phys.*, 13, *pp.* 732–744, *Dec.*, 1942.—The paper discusses the properties of (*a*) synthetic plastics from the standpoint of moulding and permanence, (*b*) glasses in the annealing range 400°–600°C., (*c*) lead in connection with its use as sheath for h.v. cables, and (*d*) the electrical ionic conductivity of solid insulating materials in relation to their plastic flow resistance. The 3 chief methods of moulding are discussed, and 2 methods are described for acquiring more complete information than is offered by the so-called softening point. There is no variation of the flow resistance of glasses with stress as in metals, but a time const. of relaxation can be defined and determined. The plastic properties of lead are reviewed and the processes occurring in the cable sheath are discussed; there is a very intimate quantitative connection betw. d.c. conductivity and steady-state flow resistance in solids. G. E. A.

PHYSICAL CHEMISTRY

1519 541.113 = 3

The hysteresis phenomenon. SMITS, A. *Z. phys. Chem. B*, 51, *pp.* 1–8, *Dec.*, 1941.—The results of previous investigations on NH_4Br [Abstr. 1255 (1936)] and ND_4Br [Abstr. 2452 (1941)] are analysed with a view to explaining the peculiar trend of the hysteresis lines of the mol. vol./temperature diagram. An explanation is found by comparison of the trend of the de-mixing lines of the pseudo-system and that of the lines of inner equilibrium of the simple system in the temperature/conc. diagram. R. N.

1520 541.123

A study of heterogeneous equilibria in aqueous solutions of the sulphates of tetravalent vanadium at 30°. ROHRER, C. S., LANFORD, O. E., AND KIEHL, S. J. *J. Amer. Chem. Soc.*, 64, *pp.* 2810–2816, *Dec.* 1942.—Solubility measurements are given for the ternary system VO_2-SO_3-H_2O at 30° and an isothermal ternary diagram is constructed. A soluble form of the anhydrous normal vanadyl sulphate has not previously been reported.

See Abstr. 1350 541.123.2 + 535.324 + 535.563 + 532.14

1521 541.123.2

Phase equilibria in hydrocarbon systems. REAMER, H. H., OLDS, R. H., SAGE, B. H., AND LACEY, W. N. *Industr. Engng Chem.*, 34, *pp.* 1526–1531, *Dec.* 1942.—[See Abstr. 763 (1943)]. The sp. vol. of mixtures of methane and decane were established betw. 100° and 460°F. up to 10 000 lb./in.^{2} The composition of the gas phase was determined exp. throughout the heterogeneous region in the same temperature interval. From these data the sp. vol. bubble-point pressures and dew-point pressures, and dew-point pressures for each of the mixtures, as well as the properties of the co-existing phases, were established.

1522 541.123.2

Vapour-liquid equilibria for commercially important systems of organic solvents. BRUNJES, A. S., AND BOGART, M. J. P. *Industr. Engng Chem.*, 35, *pp.* 255–260, *Feb.*, 1943.—Data are presented for the binar

stems ethanol-*n*-butanol, acetone-water and iso-opanol-water. Activity coeff. for the acetone-ater and isopropanol-water systems are also given.

1523 541.123.2 = 3

On mixture gaps. II. The system methyl-acetate–rbon-disulphide. KLUSIUS, K., AND ULMKE, H. *phys. Chem. A*, 189, *pp.* 331–334, *Oct.*, 1941.—The ip in the mixture of $CH_3COO.CH_3$ and CS_2 was vestigated with the method previously described bstr. 2119 (1941)]. The upper crit. temp. of solu-on is − 52·6°C. with 61 mol.% CS_2. This is the west upper crit. point known so far. The results e tabulated. The graph for the mutual solubility is symmetrical. R. N.

1524 541.123.2.034.6

Liquid-vapour equilibrium compositions in hydrogen-loride–*n*-butane system. OTTENWELLER, J. H., OLLOWAY, C., JR., AND WEINRICH, W. *Industr. ngng Chem.*, 35, *pp.* 207–209, *Feb.*, 1943.—The mpositions of equilibrium vapour-liquid mixtures the HCl-*n*-butane system were determined at 70°, 0° and 180°F. for pressures < 550 lb./in.² using const. vol. apparatus.

1525 541.123.21

Equilibria in ethanol-water system at pressures less an atmospheric. BEEBE, A. H., JR., COULTER, K. E., NDSAY, R. A., AND BAKER, E. M. *Industr. Engng hem.*, 34, *pp.* 1501–1504, *Dec.*, 1942.—Liquid-vapour uilibria in the system ethanol-water are presented r 95, 190 and 380 mm. of mercury. Reducing the essure increases the rel. volatility of ethanol at liquid mpositions > 0·21 mole fraction of ethanol and ecreases the rel. volatility at lower compositions.

1526 541.123.21

A hydrothermal study of equilibria in the system lumina-water. LAUBENGAYER, A. W., AND WEISZ, . S. *J. Amer. Chem. Soc.*, 65, *pp.* 247–250, *Feb.*, 943.—The system was studied in the range 100°–00°. The phases involved were identified by X-ray nd microscopic methods. Corundum is the stable hase above (450 ± 5)°. γ-alumina is metastable roughout. Diaspore is stable below (450 ± 5)°, wer limit 280°. Böhmite is stable betw. 155°–280°. ibbsite is unstable above 155°. Bayerite is unstable bove 155°.

See Abstr. 1301 541.123.21 : 518.5

1527 541.123.31 : 532.14 : 535.324

The system water–*n*-butanol–toluene at 30°. FUOSS, . M. *J. Amer. Chem. Soc.*, 65, *pp.* 78–81, *Jan.*, 943.—Equilibrium conc. at 30° for the 2-phase stem of water, butanol and toluene were deter-ined. A new method of determining liquid solu-ilities is described. Densities and indices of re-action for the system are given.

See Abstr. 1432 541.124 : 532.74 : 541.65 : 535.563

1528 541.124 : 532.771 = 3

Chemical reactions in very diluted aqueous solutions. ARAOGLANOV, Z. *Kolloid Z.*, 95, *pp.* 43–58, *April*, 941.—When reactions take place in very dilute olutions the colloidal state plays an important part, etermining the critical conc. of the reagents and the fluence of the duration of the test on the course of e reactions, causing pseudo-colour-reactions, etc. R. N.

1529 541.124 : 539.4.015 : 678.02

Chemical reactions during vulcanization. IV. Liquid rubber latex. HAUSER, E. A., BEAU, D. S. LE, AND KAO, J. Y. L. *J. Phys. Chem.*, 46, *pp.* 1099–1111, *Dec.*, 1942.—[See Abstr. 753 B (1942)]. The mechanism involved in the vulcanization of rubber latex was investigated by experiments on the time and temperature of vulcanization and on the amount of S, ZnO and accelerators with ref. to tensile strength, elongation, combined S and unsaturation, and, for rubber latex, the S combined during liquid vulcanization and any additional combination of S during drying. Results are plotted graphically and indicate that actual vulcanization occurs at the surface layer of the rubber particle irrespective of the amount of S which may diffuse into the interior before its activation. Drying rates show that a definite change occurs after a certain amount of water has been removed. Industrial implications derived are that a careful control of the time of preheating, the amount of vulcanizing ingredients and the time of actual vulcanization is essential in producing films with max. mech. properties. N. M. B.

See Abstr. 1505 541.124 : 678 : 539.26

1530 541.127 : 532.73

Rate of solution of magnesium in acids. JAMES, T. H. *J. Amer. Chem. Soc.*, 65, *pp.* 39–41, *Jan.*, 1943.—The rate of solution of Mg in various acids was studied by a method which gave results indep. of the agitation rate.

See Abstr. 1395 541.127 : 535.247.4

1531 541.127 : 541.128

The kinetics of the ammonolysis of 9-phenyl-9-chlorofluorene by liquid ammonia. WILLIAMSON, P. M., ANDERSON, R. C., AND WATT, G. W. *J. Amer. Chem. Soc.*, 65, *pp.* 49–51, *Jan.*, 1943.—The ammonolysis of 9-phenyl-9-chlorofluorene by liquid NH_3 is a pseudo first-order reaction involving autocatalysis by NH_4Cl. Values for the reaction velocity const. and energy of activation for both the catalysed and uncatalysed reactions are recorded.

1532 541.127 : 541.64 = 3

The polymerization of the methylic ester of methacrylic acid under the action of benzoyl-peroxide (On the kinetics of chain polymerization XIV). SCHULZ, G. V., AND BLASCHKE, F. *Z. phys. Chem. B*, 51, *pp.* 75–102, *Jan.*, 1942.—The reaction mechanism is investigated by determining the velocity and average deg. of polymerization as functions of conc., temperature and time. The primary reaction proceeds in 2 steps. An intermediate product is formed of peroxide and monomer and this is changed to the active primary product. Then a growth reaction occurs in which more molecules are taken up. Similarly 2 reactions are effective at the breaking of the chain. The reaction const. and the course of the reaction are determined. R. N.

See Abstr. 1531 541.128 : 541.127

See Abstr. 1376 541.132 : 532.739.2

1533 541.132 : 536.7

The acidic ionization constant of glycine in dioxane–water solutions. HARNED, H. S., AND BIRDSALL, C. M. *J. Amer. Chem. Soc.*, 65, *pp.* 54–57, *Jan.*,

1943.—The acidic ionization const. of the ampholyte glycine is determined by measurement of the electromotive forces of the cell $H_2/Z^{\pm}$ (m_1), HZCl (m_2), X%D, Y%H_2O/AgCl–Ag and subsequent calculations. The measurements were carried out in media containing 20, 45 and 70% dioxane by wt. and from 0° to 50° inclusive.

1534 541.134 : 536.7 : 532.77

The thermodynamics of aqueous solutions of sodium chloride at temperatures from 15°–45° from e.m.f. measurements on cells with transference. JANZ, G. J., AND GORDON, A. R. *J. Amer. Chem. Soc.*, 65, *pp.* 218–221, *Feb.*, 1943.—The e.m.f. of the cell with transference Ag, AgCl/NaCl(m_1)//NaCl(m_2)/AgCl, Ag was measured for conc. up to 0·1 molal from 15°–45°. Activity and osmotic coeff. were obtained.

See Abstr. 1464 541.134 : 537.221

1535 541.134.5 : 541.57

Polarographic investigations of hydrogen bonding. I. *ortho*- and *para*-nitrophenols. ASTLE, M. J., AND MCCONNELL, W. V. *J. Amer. Chem. Soc.*, 65, *pp.* 35–38, *Jan.*, 1943.—The ½-wave reduction potentials for *o*-nitrophenol are more pos. than those for *p*-nitrophenol or *o*-nitroanisole in acid solution but have about the same values in basic solutions. The wave height for the reduction of *o*-nitrophenol in acid solution is ⅔ the height for *o*-nitrophenol in basic solution or for *p*-nitrophenol at any *p*H.

See Abstr. 1542 541.135 : 541.182.6

1536 541.135.5 : 536.7

The cerium amalgam electrode and the thermodynamics of aqueous cerium(III) sulphate solutions. WALTERS, G. C., AND VRIES, T. DE. *J. Amer. Chem. Soc.*, 65, *pp.* 119–122, *Jan.*, 1943.—A 2-phase Ce amalgam was used as an electrode with $Ce_2(SO_4)_3$ solutions. The std. molal potential is calculated. The mean activity coeff. of $Ce_2(SO_4)_3$ from 0·007 *m* to saturation and the free energy, heat and entropy changes for the cell reaction are calculated.

1537 541.143 : 535.37

Reversible photochemical processes in rigid media: the dissociation of organic molecules into radicals and ions. LEWIS, G. N., AND LIPKIN, D. *J. Amer. Chem. Soc.*, 64, *pp.* 2801–2808, *Dec.*, 1942.—When tetraphenylhydrazine in a rigid solvent is illuminated by ultra-violet light, the solution becomes coloured and shows 3 main absorption bands, each of which is due to a sep. substance. In order to identify these substances and to find what types of photochemical reaction are possible under these circumstances, various substances have been similarly studied. A molecule may be dissociated by light into 2 radicals, into pos. and neg. ions, and into a pos. ion and an electron. From the illumination of several substances containing the diphenylnitrogen group it has been possible to find the absorption bands of $(C_6H_5)_2N$ and $(C_6H_5)_2N^+$. These are two of the main substances produced in the illumination of tetraphenylhydrazine. The third is $(C_6H_5)_2NN(C_6H_5)_2^+$, which disappears by 2 processes: one is the return of the electron, the other is dissociation into $(C_6H_5)_2N$ and $(C_6H_5)_2N^+$. The latter process is unimolecular.

See Abstr. 1436 541.18 : 581.132 : 535.66

1538 541.18 : 621.385.833

Applications of the electron microscope in colloid chemistry. MARTON, L. *J. Phys. Chem.*, 46, *pp.* 1023–1031, *Dec.*, 1942.—[Abstr. 1399 B (1943)].

See Abstr. 1472 541.18.043 : 616.2 : 537.363

See Abstr. 1346 541.182 : 532.133

1539 541.182 : 535.822.4 : 678

Motion-picture study of balata and hevea latices. LUCAS, F. F. *Industr. Engng Chem.*, 34, *pp.* 1371–1381, *Nov.*, 1942.—Rel. positions of rubber latex particles as disclosed by ultra-violet micrographs suggest that colloidal dispersions consist of an orderly arrangement of particles controlled by forces acting betw. particles. Precision motion pictures embodying colour-differential illumination reveal the particles in colour against a field of the complementary colour. Three-colour combinations are employed resulting in symmetrical colouring of particles and introducing the third dimension. Motions of the particles can be followed. A common element of structure consists of a primary particle and one or more satellites gyrating about it. Chains form and break up, and others form in a constantly changing pattern. Activity of motion increases with the conc. of particles. Buna S and neoprene latices have been filmed.

1540 541.182.046.7 : 535.434 : 537.36 = 3

On precipitation phenomena. II. The connection between precipitation phenomena and fine structure of the electrokinetic double layer with AgCl-surfaces in aqueous NaCl-solutions. TEŽAK, B. *Z. phys. Chem. A*, 190, *pp.* 257–271, *April*, 1942.—A periodic connection was found betw. the stability of the AgCl particles precipitated and the conc. of the NaCl solution. This is explained by the arrangement of anions and cations in the boundary layers. The experiments are based on the changes of the Tyndall effect with concentration and with time. R. N.

See Abstr. 1369 541.182.2 : 532.72

1541 541.182.5 : 541.183.25

The elimination of sorption-desorption hysteresis in hydrous oxide gels. II. Tantalum pentoxide, stannic oxide and titanium dioxide. WEISER, H. B., MILLIGAN, W. O., AND SIMPSON, W. C. *J. Phys. Chem.*, 46, *pp.* 1051–1059, *Dec.*, 1942.—[See Abstr. 2927 (1942)]. Sorption-desorption hysteresis with water is modified, reduced or eliminated in gels formed by hydrolysis of the resp. salts at the b.p. and ageing of the sol particles before coagulating the sols to gels. The aged gels of Si and of Ta_2O_5 gave amorphous-type diffraction patterns with both X-rays and electrons, whereas the aged gels of SnO_2 and TiO_2 gave weak X-ray diffraction patterns corresponding to cassiterite and anatase, respectively. [See Abstr. 255 (1942)].

See Abstr. 1545 541.182.5 : 541.183.26

1542 541.182.6 : 541.135

The clays as colloidal electrolytes. MARSHALL, C. E., AND KRINBILL, C. A. *J. Phys. Chem.*, 46, *pp.* 1077–1090, *Dec.*, 1942.—Potentiometric Na and H determinations and conductance measurements have been made over the course of the titration curves of electrodialysed montmorillonite, beidellite, illite and kaolinite. Part of the Na remains un-ionized.

or the three cations Na^+, K^+ and NH_4^+, the ioniza-
on of the clay salts follows the order kaolinite
montmorillonite > beidellite > illite, whereas the
parent strengths of the clay acids are in the order
ontmorillonite > beidellite > illite > kaolinite.

1543 541.182.63 : 537.241 = 3

**On the gold sol. II. Chain formation in the elec-
ical a.c. field.** KRUYT, H. R., AND VOGEL, J. G.
olloid Z., 95, *pp.* 1–20, *April*, 1941.—[See Abstr.
60 (1942)]. The chain formation causing in-
ability of the conductivity of gold sols in an a.c.
ld is investigated and compared with the forma-
n of strings of beads in milk [Abstr. 2163 (1927)].
he means for reducing the effect are discussed and
tramicroscope pictures are given showing the
rmation. The effect is explained as being due to
n incomplete discharge of the colloidal metal par-
cles nearest to the electrode under the influence of
e a.c. field, which causes a flocculation of the
rticles growing treelike from one electrode to the
her. R. N.

1544 541.182.63 : 537.533.73

**The nature of colloidal clay as revealed by the
ectron microscope.** SHAW, B. T. *J. Phys. Chem.*,
6, *pp.* 1032–1043, *Dec.*, 1942.—Electron micrographs
f montmorillonite and kaolinite are presented.
particle-size distribution of montmorillonite reflects
he deg. of dispersion. Ultimate dispersion of this
ineral leads to unit crystals (plates having a thick-
ess of approx. 1 mμ). The concept of an expanding
ttice is discussed; this concept has led to confusion
oncerning the nature of montmorillonite. The
xchange positions on kaolinite crystals are located
t plate edges.

See Abstr. 1367 541.183 : 669 : 532.696

See Abstr. 1541 541.183.25 : 541.182.5

See Abstr. 1336 541.183.26 : 531.724 :
621.385.1.032.216

1545 541.183.26 : 541.182.5

**Adsorption of propane and propylene by silica gel
nd metallized silica gel.** REYERSON, L. H., AND
INES, M. R. *J. Phys. Chem.*, 46, *pp.* 1060–1068,
Dec., 1942.—Sorptions of propane and propylene on
ilica gel and on silica gel metallized with Pd were
easured at − 25°, 0° and 35°C. The olefin is
ore strongly sorbed by the metallized surface than
y the untreated gel, and it is more strongly sorbed
han the paraffin.

1546 541.183.595 : 548.74 : 621.385.833

Adsorption at the crystal solution interface. XIII.
BLOMQUIST, J. H., AND FRANCE, W. G. *J. Phys.
Chem.*, 46, *pp.* 1044–1050, *Dec.*, 1942.—An electron-
diffraction camera adapted to the study of surface
tructure was used, with a moving crystal holder.
Data presented indicate an apparent change in the
attice const. of $NaBrO_3$ crystals grown in a solution
of a dye which is adsorbed by the $NaBrO_3$ selectively
o that its crystal habit is modified. No lattice
hange was observed for crystals grown from solu-
ions of dyes which did not change the habit of
$NaBrO_3$. This apparent lattice change may be due
o an inner potential effect or to the formation of a
olid solution.

1547 541.24 : 532.13 = 3

Viscosity and mol. wt. with chain polymers. MEYER,
K. H. *Kolloid Z.*, 95, *pp.* 70–74, *April*, 1941.—The
const. of Staudinger's viscosity law $K_m = \eta_{sp}/cM$,
where η_{sp} is the sp. viscosity, c the conc. and M the
mol. wt., cannot be considered as a const. with
unbranched chain polymers, as it decreases with in-
creasing mol. wt. The determination of mol. wt. by
extrapolation from the law is incorrect; interpolation
only, from viscosities and mol. wts. of a lower and a
higher homologue, is permissible. R. N.

See Abstr. 1370 541.25 : 532.72

See Abstr. 1338 541.25 : 548 : 531.75 = 3

See Abstr. 1491 541.5 : 539.132 = 3

See Abstr. 1419 541.57 : 535.375.5

See Abstr. 1535 541.57 : 541.134.5

See Abstr. 1423 541.63 : 535.375.5 = 3

See Abstr. 1455 541.636 : 536.632

See Abstr. 1532 541.64 : 541.127 = 3

See Abstr. 1398 541.65 : 535.32

See Abstr. 1432 541.65 : 541.124 : 532.74 :
535.563

See Abstr. 1407 541.651 : 535.343 = 3

See Abstr. 1466 541.67 : 539.133 : 537.226.2

See Abstr. 1501 541.68 : 677.31 : 539.216 = 3

1548 541.68 : 678

**Intermolecular forces and mechanical behaviour of
high polymers.** MARK, H. *Industr. Engng Chem.*, 34,
pp. 1343–1348, *Nov.*, 1942.—Strong intermolecular
forces combined with high tendency to crystallize give
typical fibres; weak forces and bulky chains favour
typically rubber-like properties. Intermediate cases
lead to materials with the character of plastics.

1549 542.29 : 621.65

A laboratory bellows pump. CORSON, B. B., AND
CERVENY, W. J. *Industr. Engng Chem.* (*Analyt.
Edit.*), 14, *pp.* 899–900, *Nov.* 15, 1942.—[Abstr.
1432 B (1943)].

See Abstr. 1300 542.48 : 518.3

See Abstr. 1500 542.67 : 539.215 = 3

1550 544.6 : 535.375.5

**Qualitative and quantitative analysis of hydrocarbon
mixtures by means of their Raman spectra.** RANK,
D. H., SCOTT, R. W., AND FENSKE, M. R. *Industr.
Engng Chem.* (*Analyt. Edit.*), 14, *pp.* 816–819, *Oct.* 15,
1942.—A linear relationship betw. the rel. intensity of
the Raman lines comp. with an internal std. and the
vol. conc. is demonstrated for 6 binary mixtures of
hydrocarbons, one of which was an azeotropic
mixture of min. b.p. Scattering coefficients are
described and values for this const. are reported for a
series of hydrocarbons.

CRYSTALLOGRAPHY

1551 548 : 531.7 = 3

**Precise determination of lattice constants and expan-
sion co-efficients of rhombic crystals as exemplified by
$PbCl_2$.** STRAUMANIS, M., AND SAUKA, J. *Z. phys.
Chem. B*, 51, *pp.* 219–228, *April*, 1942.—The deter-
mination of the lattice constants was carried out by
rotating the crystal consecutively around 2 axes per-

pendicular to each other. The necessary precautions with rel. to the magnitude of the angles of incidence are discussed. The measurements were made at 3 different temperatures. The method is explained using $PbCl_2$ crystals as an example, the results are tabulated and their accuracy discussed. R. N.

See Abstr. 1428, 1429	548 : 535.52
See Abstr. 1460	548 : 536.7
See Abstr. 1338	548 : 541.25 : 531.75 = 3
See Abstr. 1383	548.7 : 534.133
See Abstr. 1546	548.74 : 621.385.833 : 541.183.595

GEOPHYSICS

See Abstr. 1320	550.385 : 523.755 = 3
See Abstr. 1358	551.351.2 : 532.59

1552 551.593 : 628.92

Illumination from a non-uniform sky. Moon, P., and Spencer, D. E. *Illum. Engng, N.Y.*, 37, *pp.* 707–726, *Dec.*, 1942.—[Abstr. 1433 B (1943)].

1553 551.594.221 : 621.3.015.3 : 621.317.3

Waiting for lightning. Mahoney, J. J. *Bell Lab. Rec.*, *pp.* 86–90, *Dec.*, 1942.—[Abstr. 1291 B (1943)].

VARIOUS SUBJECTS

See Abstr. 1359	576.3 : [532.61 + 532.13 + 539.4
See Abstr. 1476	576.312.3 : 539.185.9 537.531.9
See Abstr. 1436	581.132 : 541.18 : 535.66
See Abstr. 1408	591.111 : 535.343 = 3
See Abstr. 1498	615.84 : 539.185.9
See Abstr. 1472	616.2 : 541.18.043 : 537.363
See Abstr. 1305	616.9 : 519.283
See Abstr. 1449	632.94 : 536.423.15
See Abstr. 1507	666 : 539.26
See Abstr. 1344	666.1/.2 : 532.13
See Abstr. 1367	669 : 541.183 : 532.696
See Abstr. 1357	669.13 : 532.542.1
See Abstr. 1515	669.14-41 : 539.4.016.3
See Abstr. 1514	669.6 : 539.4.015.1
See Abstr. 1513	669.71 : 539.4
See Abstr. 1503	677.31 : 531.71 : 539.216.1
See Abstr. 1508	677.31 : 539.216 : 539.264 = 3
See Abstr. 1501	677.31 : 541.68 : 539.216 = 3
See Abstr. 1345	677.47 : 532.13

1554 678

Progress in rubber chemistry. *Industr. Engng Chem.*, 34, *pp.* 1256–1381, *Nov.*, 1942.—A symposium of papers, with the following titles: The synthetic programme. (Extracted from the Report of the Baruch Committee to the President of the United States); Progress of butadiene production, Elder, A. L.; Progress of styrene production, Dow, W. Action of organic accelerators in buna S, Vila, G. R. Effect of carbon blacks in synthetic tire compounds Garvey, B. S., Jr., and Freese, J. A., Jr. [Abstr. 151 (1943)]; Perbunan properties and compounding Moll, R. A., Howlett, R. M., and Buckley, D. J. Density measurements on synthetic rubbers, Wood L. A., Bekkedahl, N., and Roth, F. L. [Abstr. 59 (1943)]; Thermal decomposition of natural and syn thetic rubber stocks, Prettyman, I. B.; Effect o petroleum products on neoprene vulcanizates, Frazer D. F.; Butyl rubber properties and compounding Haworth, J. P., and Baldwin, F. P.; Processin characteristics of synthetic tyre rubber, Garvey B. S., Jr., Whitlock, M. H., and Freese, J. A., Jr. Ebonite from Hycar OR-15, Garvey, B. S., Jr., an Sarbach, D. V.; Volume change of hycar OR-1 compounds on immersion, Juve, A. E., and Garvey B. S., Jr. [Abstr. 1510 (1943)]; Evaluation of smal amounts of synthetic rubber, Garvey, B. S., Jr. Unsaturation of synthetic rubberlike materials Cheyney, La V. E., and Kelley, E. J.; Effect of anilin point of oil on swelling of synthetic rubbers, Hanson A. C. [Abstr. 1511 (1943)]; Growing rubber in Nort America, Trumbull, H. L.; USF, a new crude rubber McGavack, J., Linscott, C. E., and Haefele, J. W. Rise of temperature on fast stretching of synthetic and natural rubbers, Dart, S. L., Anthony, R. L. and Guth, E. [Abstr. 1509 (1943)]; Intermolecula forces and mechanical behaviour of high polymers Mark, H. [Abstr. 1548 (1943); Equation of state o some synthetic rubbers, Peterson, L. E., Anthony R. L., and Guth, E. [Abstr. 1461 (1943)]; Effect o temperature and pressure on oxygen-pressure ageing Neal, A. M., Bimmerman, H. G., and Vincent, J. R. Vibration properties of rubber-like materials, Stam baugh, R. B. [Abstr. 1384 (1943)]; Theory of rubbe elasticity for development of synthetic rubbers, James H. M., and Guth, E.; Natural ageing of reclaime rubber, Palmer, H. F., and Crossley, R. H.; Motion picture study of balata and Hevea latices, Lucas, F. F [Abstr. 1539 (1943)].

See Abstr. 1539	678 : 535.822.4 : 541.182
See Abstr. 1509	678 : 536 : 539.379
See Abstr. 1461	678 : 536.7
See Abstr. 1377	678 : 536.7 : 532.77
See Abstr. 1510, 1511	678 : 539.388.8
See Abstr. 1384	678 : 539.433 : 534.143
See Abstr. 1505	678 : 541.124 : 539.26
See Abstr. 1548	678 : 541.68
See Abstr. 1529	678.02 : 539.4.015 : 541.124
See Abstr. 1512	678.7 : 539.4/.5
See Abstr. 1424	681.4 : 535.417
See Abstr. 1439	77 : 535.842
See Abstr. 1440	778.3 : 535.843